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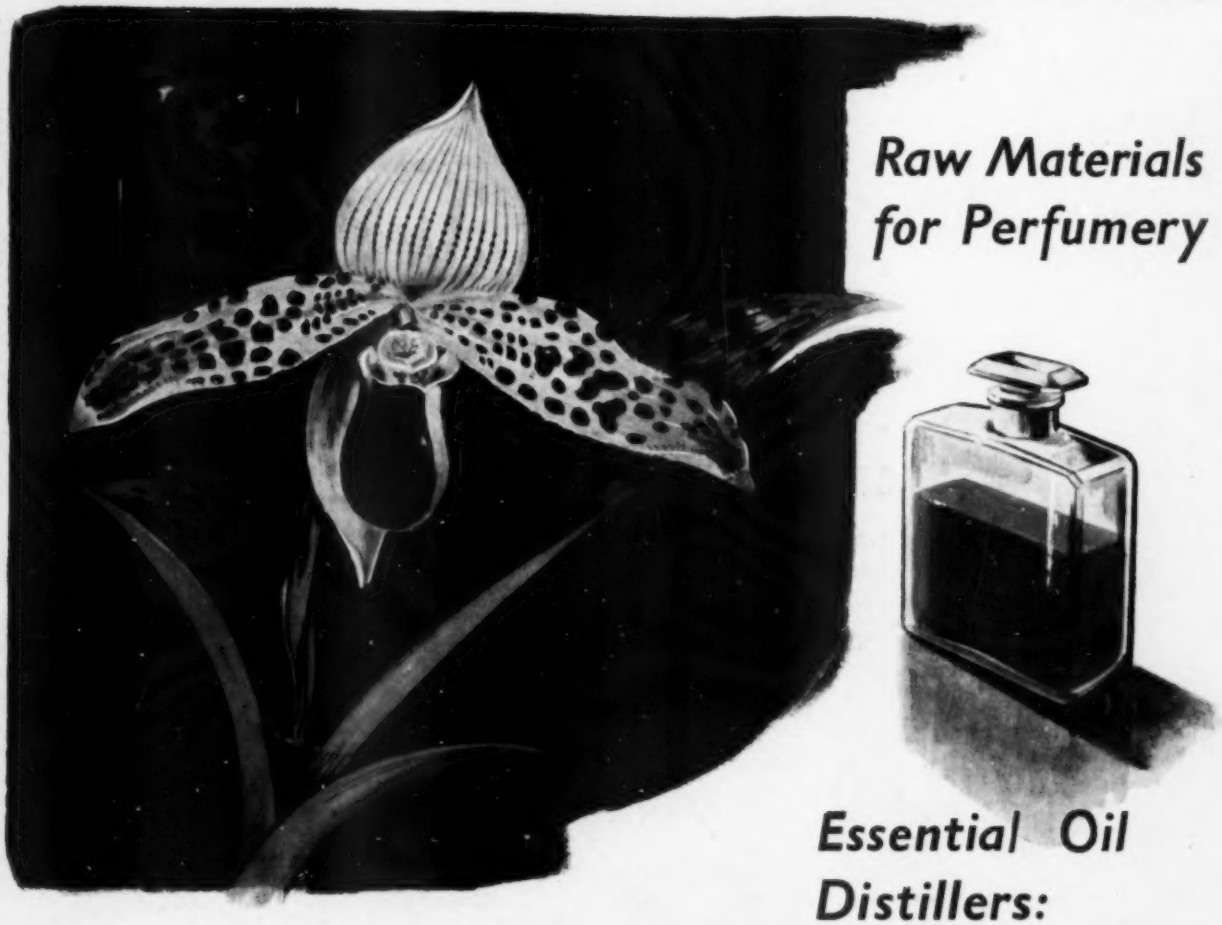

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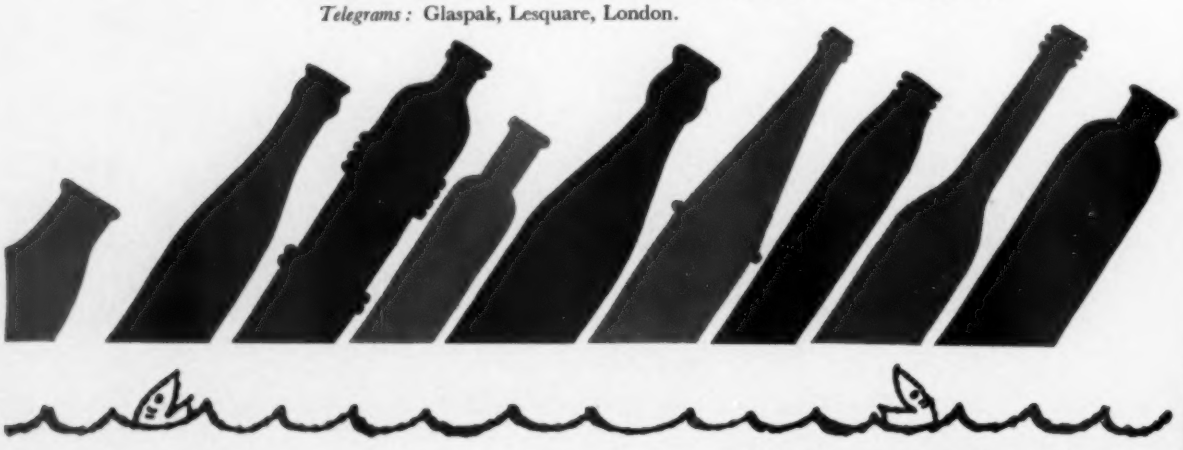

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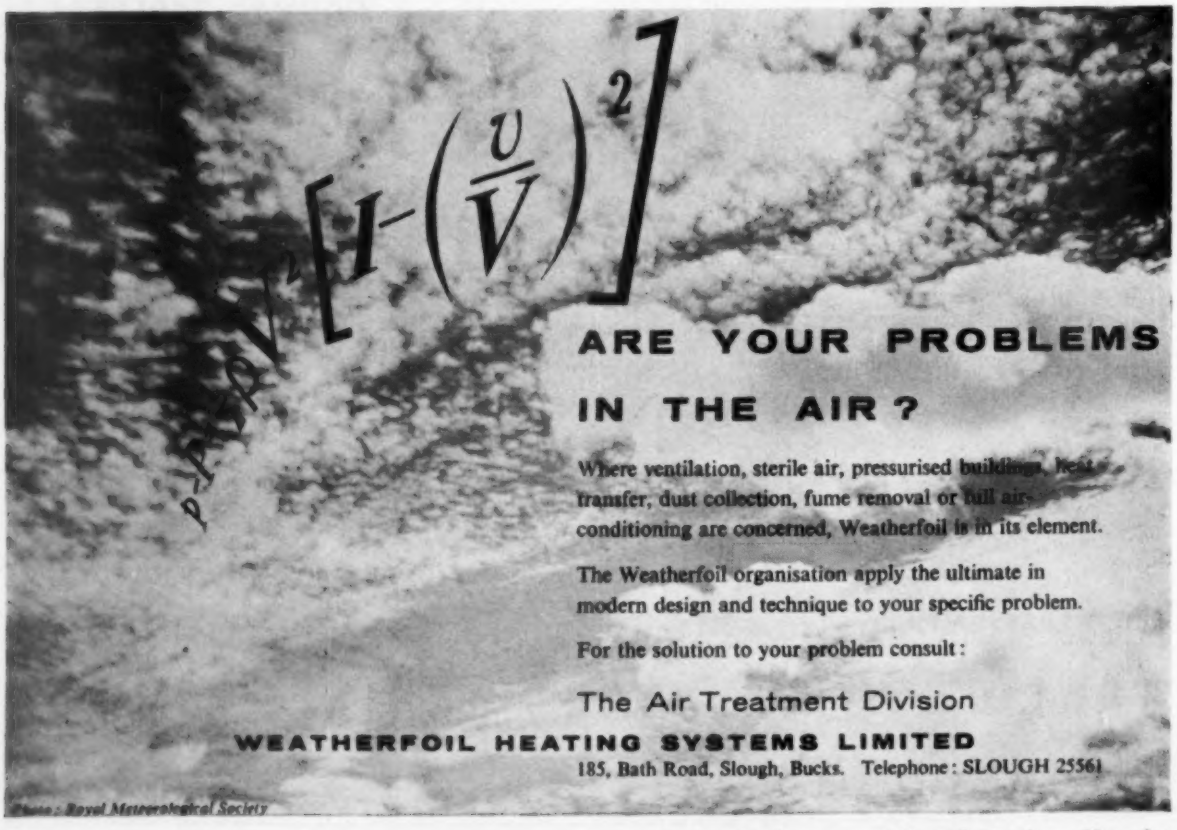
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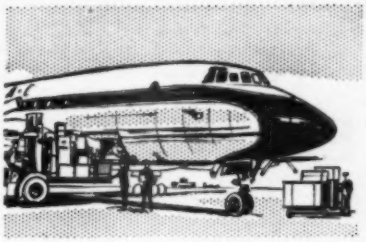

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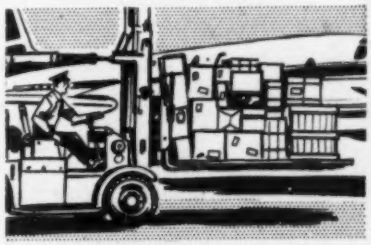

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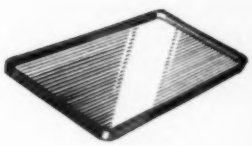

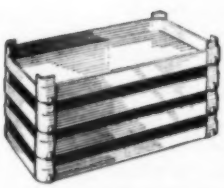

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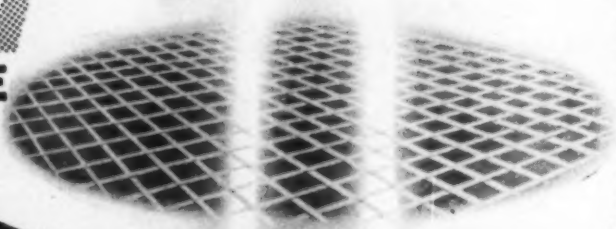

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for ALL ENGINEERING SUPPLIES –

COCKS, VALVES
GAUGES, ETC.
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8022 BELTINGS, VEE ROPES
25 lines OILS AND GREASES
HOSES AND FITTINGS
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W.H.WILLCOX & CO. LTD.

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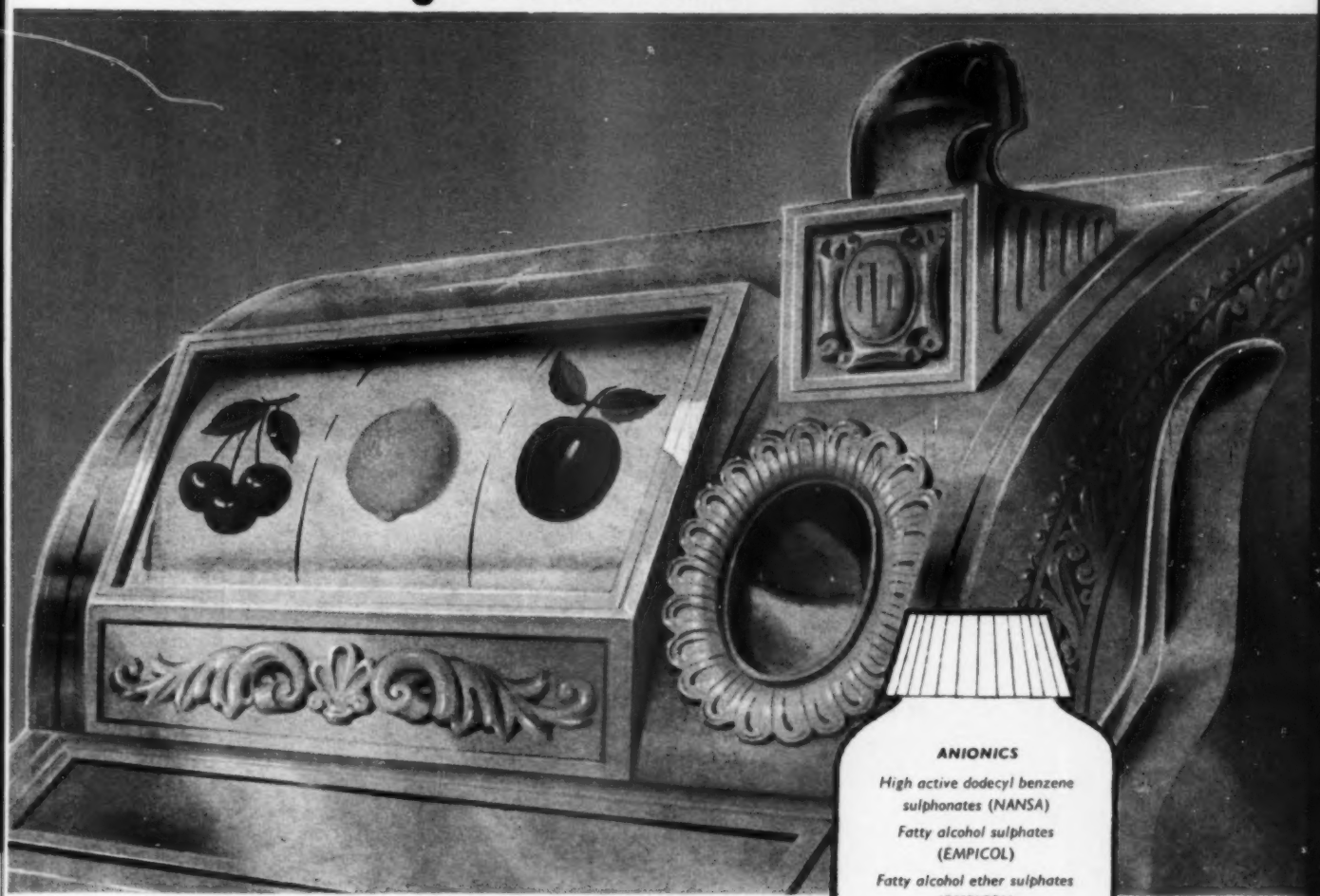
Here the right combination comes with luck



ANIONICS

High active dodecyl benzene sulphonates (NANSA)

Fatty alcohol sulphates (EMPICOL)

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NON-IONICS

Fatty acid mono—and dialkylolamides (EMPILAN)

Polyethanoxy ethers of fatty acid monoalkylolamides (EMPILAN)

Other ethylene oxide derivatives

SOLUBILIZERS

Substituted aromatic sulphonates (sodium and potassium xylene and toluene sulphonates) (ELTESOL)

—but with Marchon...

Precise formulation is a key factor in satisfying the increasing, and increasingly selective, 'liquid' market. Marchon offers a full range of components suitable for dishwashing, hard-surface cleaning and fine fabric washing liquids; the many thousands of useful combinations derived from these components include exactly the one which will satisfy your particular requirements. Please write for technical data.

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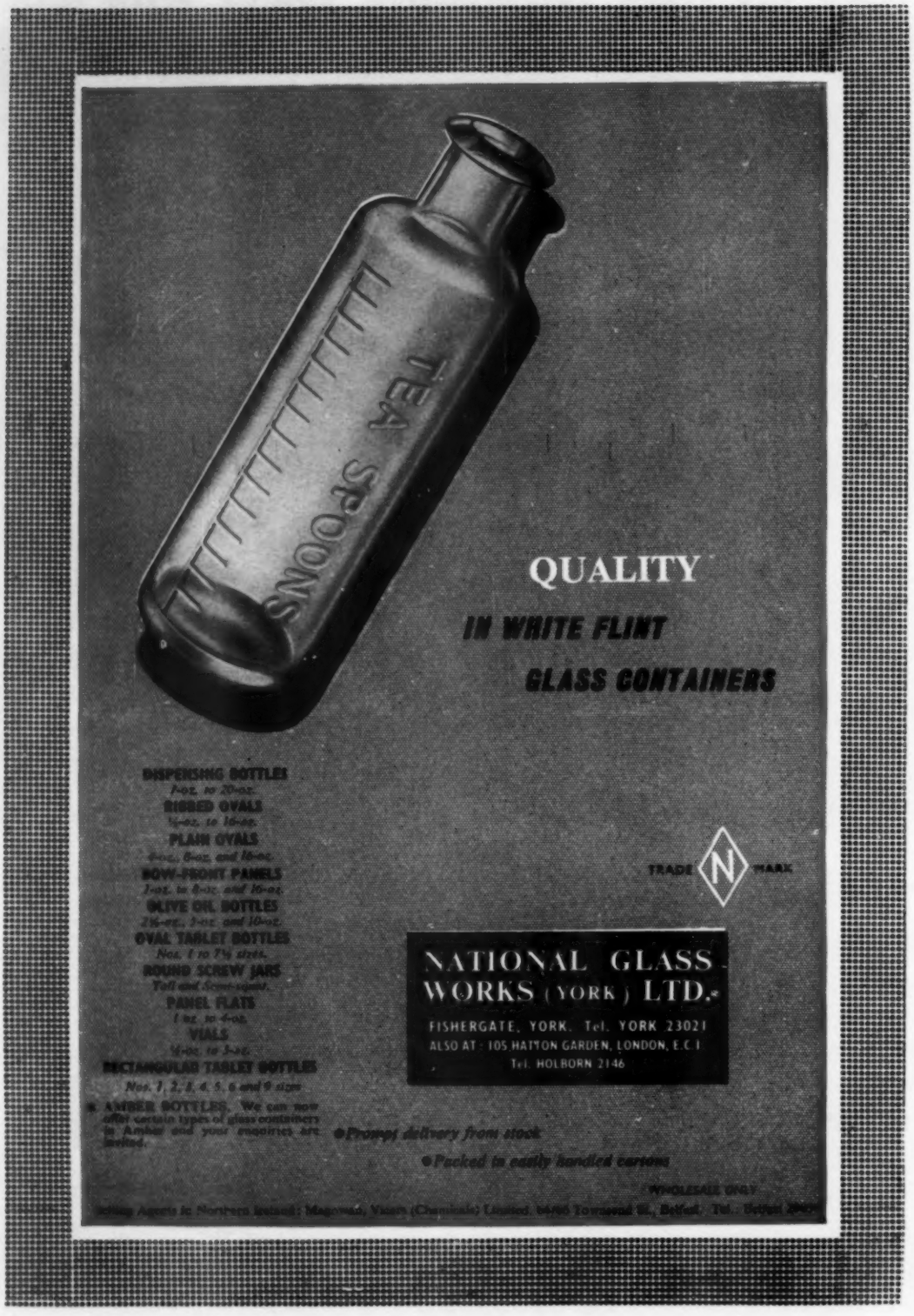
Member of the Albright & Wilson Group of Companies.

Marchon
PRODUCTS LIMITED

Marchon's products include basic raw materials and additives for every form of domestic and industrial detergent.

MAR. 11896


TEA SPOONS
QUALITY
IN WHITE FLINT
GLASS CONTAINERS
DISPENSING BOTTLES
1-oz. to 20-oz.
RIBBED OVALS
½-oz. to 16-oz.
PLAIN OVALS
4-oz., 8-oz. and 16-oz.
BOW-FRONT PANELS
1-oz. to 8-oz. and 16-oz.
OLIVE OIL BOTTLES
2½-oz., 3-oz. and 10-oz.
OVAL TABLET BOTTLES
Nos. 1 to 7½ sizes.
ROUND SCREW JARS
Tall and Screw-squat.
PANEL FLATS
1 oz. to 4-oz.
VIALS
½-oz. to 3-oz.
RECTANGULAR TABLET BOTTLES
Nos. 1, 2, 3, 4, 5, 6 and 9 sizes
AMBER BOTTLES. We can now offer certain types of glass containers in Amber and your enquiries are invited.
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NATIONAL GLASS WORKS (YORK) LTD.
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Packed in easily handled cartons
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consistency... choose

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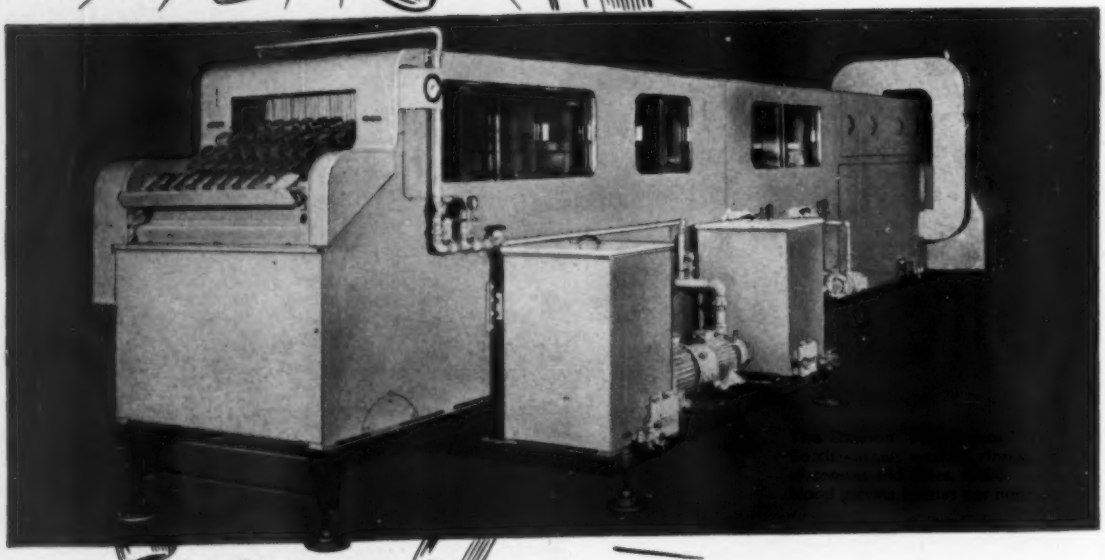
See how they sparkle -thanks to -



Dawson Cleaning Machines

No matter what the shape or size of the bottles or jars, there is a Dawson machine to clean them (in hundreds per hour or thousands) — and there are other Dawson machines for washing all kinds of laboratory glassware.

Write for further details to:

Dawson

DAWSON BROS. LTD., Gomersal, Nr. LEEDS

Tel. Cleckheaton 3422 (5 lines)

LONDON WORKS : Roding Lane South, Woodford Green, Essex *Tel. Wanstead 7777 (4 lines)*

and now—

METAL BOX OFFERS

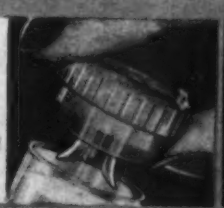
printed

POLYSTYRENE TUBES

The *colour printed* polystyrene tube is the latest aid to the sale of tablets. Direct printing in two colours on the surface of the tube replaces labelling entirely, and the tube presents an extra smart and attractive appearance on the sales counter. Polystyrene tubes are tough and light. Each is effectively sealed by a one-piece polythene stopper, easy to remove and easy to replace. For additional sales-appeal a wide range of coloured stoppers is available. Please ask today for samples and further details.

Pack your products in containers that will not be left on the bathroom shelf! Metal Box polystyrene tubes are attractive and *specially designed to be carried in the pocket or handbag.*

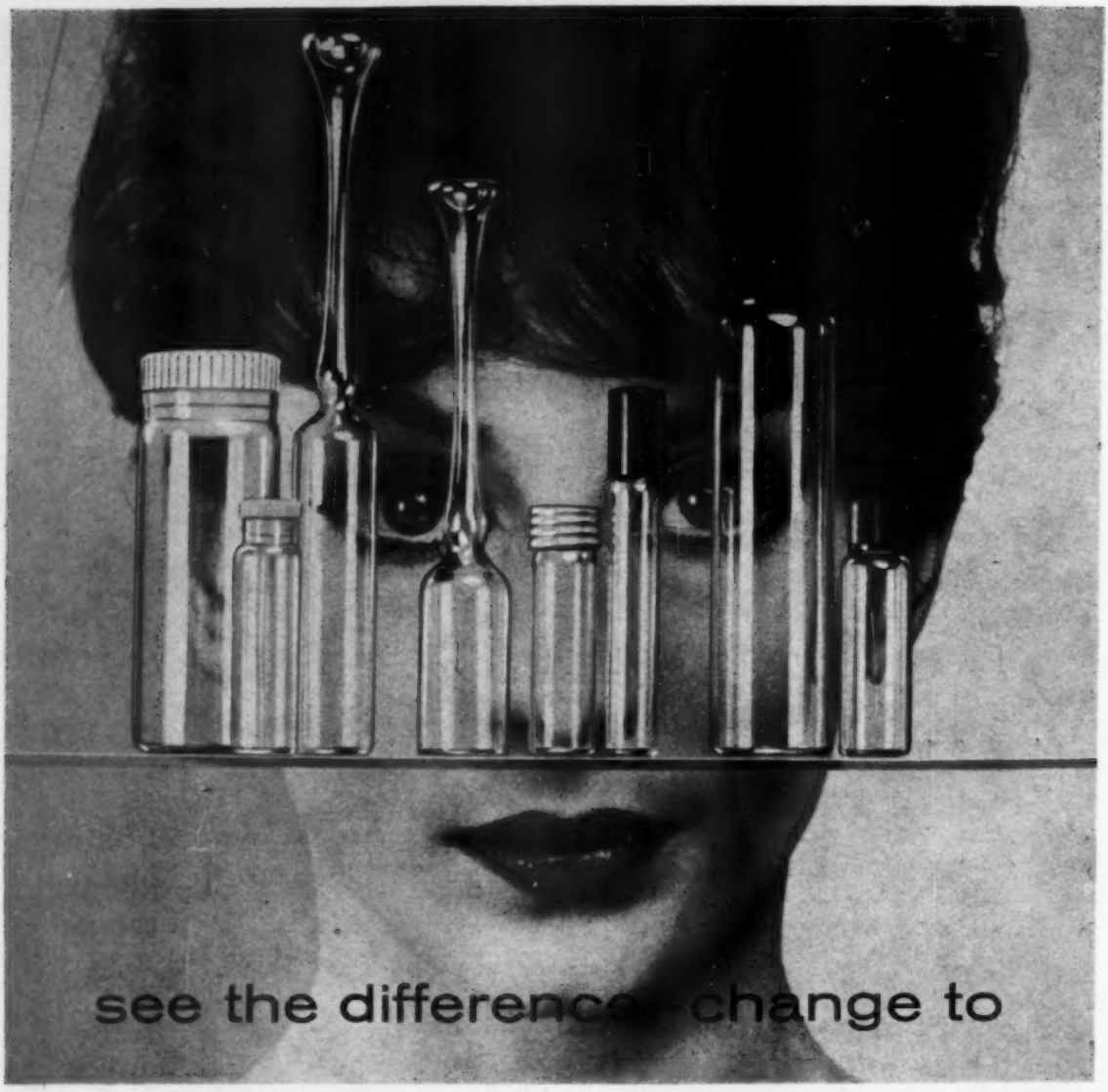
CUT THE COST OF COTTON WOOL!



The Pillar Pack Stopper with the flexible prongs holds tablets gently in place, keeping them undamaged. No cotton wool is needed, no labour to insert it. The tube looks neat, clean and efficient. Pillar Pack Stoppers can be supplied with the ¾" × 2½" tube, and are used by ICI for the Savlon pack featured in the main illustration.

THE METAL BOX COMPANY LIMITED

Plastics Group · **37 BAKER STREET · LONDON · W.1 · Hunter 6577**



TRIDENT
TUBULAR GLASS CONTAINERS

The noticeable thing about Trident tubular glass containers is the clarity of the glass. It has superb brilliance. That's because Trident tubes, vials and ampoules are drawn from bright, clear tubing enhancing the products on view and giving a different, more expensive look to them. We have a wide range of standard sizes, shapes and closures, at prices competitive with other kinds of containers, and we can supply almost any special size required at no great extra expense.

A further sound reason for changing to Trident tubular glass containers is the saving in packing and freight charges. They occupy a minimum of packing space and, because of their lightness in weight, freight charges are quite considerably reduced.

If you are planning a new product or giving new life to an old one, we would like to help you. Ask for our new catalogue.

Johnsen & Jorgensen Ltd.
Trident Glass Works,
Herringham Road, Charlton,
London, S.E.7.
Telephone: Greenwich 0151 (5 lines)

See our exhibit at The Packaging Centre, Poland Street, London, W.1.

WHAT GOES ON UNDERNEATH?

HE KNOWS.... that most of the iceberg and all of the fish are below the surface
WE KNOW..... that the firm stable foam which Ethylans have helped to produce is a fitting cloak for the hard cleaning that goes on underneath.

ETHYLAN DETERGENT ADDITIVES
can improve your product in many ways:-
INCREASED WASHING POWER, BETTER DIRT SUSPENSION, MILDNESS TO HANDS & FABRICS
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Versatile Poly-Tainers
do all these jobs—cheaply and well!

The flexibility of Poly-Tainers makes it possible to use them with a variety of simple, inexpensive fitments to spray, puff, pour or otherwise dispense many different products. Add to this the other advantages of Poly-Tainers: they are light, virtually unbreakable and can be custom-moulded to almost any shape and in many colours. There is also a wide range of stock moulds to choose from, and bottles from these moulds can be printed or embossed.

Custom-made Poly-Tainers are not expensive, especially for long runs. Alternatively stock bottles from 4 oz. to one gallon are available plain, printed, and some can even be custom embossed. Ask for the Poly-Tainer booklet NOW.

Poly-Tainer Regd

METAL BOX PLASTICS

The Plastics Group of
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***Telephone:* Hunter 5577**

Poly-Tainers are helping to sell these, and many others—

Cosmetic and Toilet Preparations
HAIR LACQUERS AND SPRAYS
DEODORANT SPRAYS
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TALCUM AND DUSTING POWDERS
LIQUID MAKE-UP
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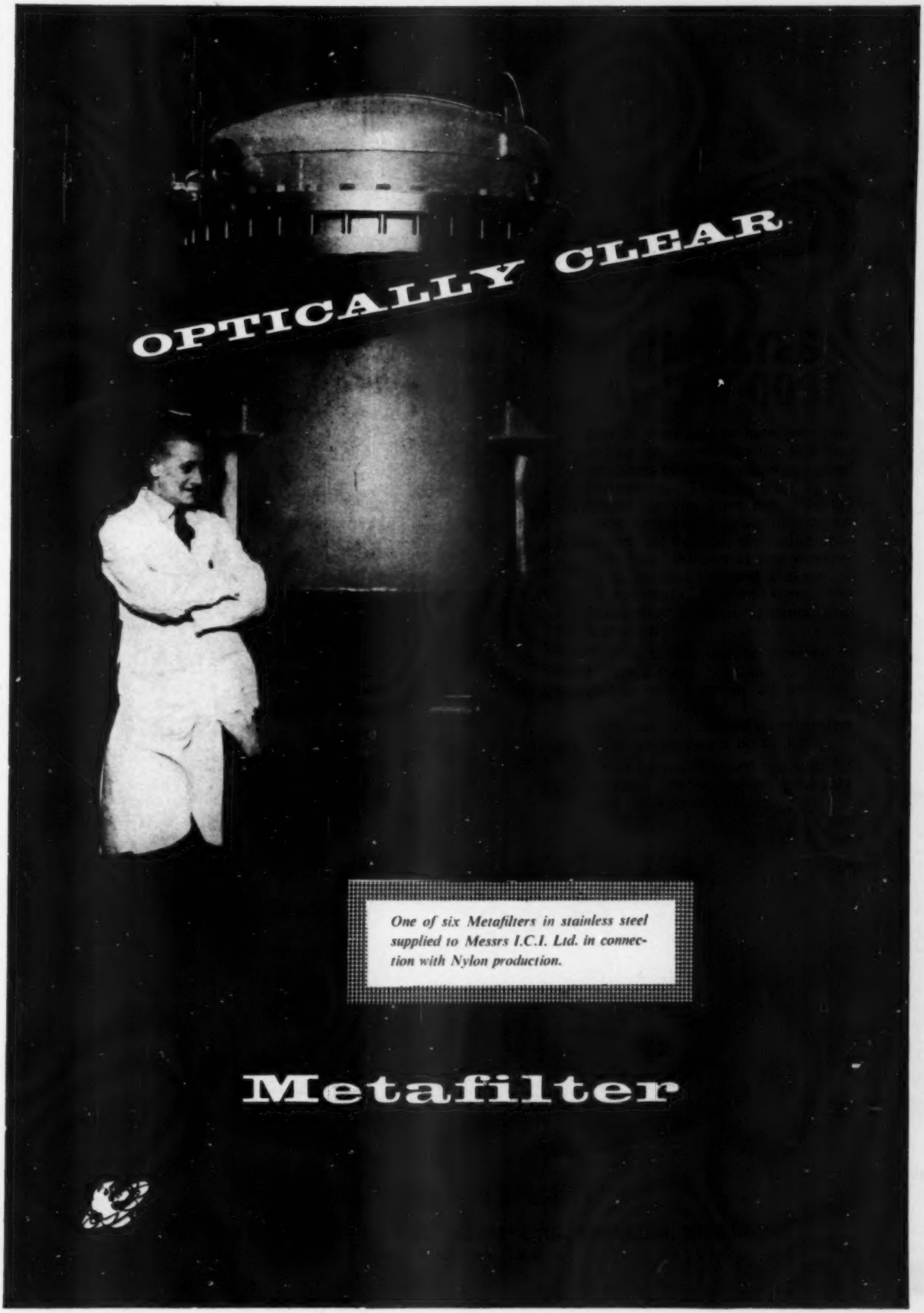
DISINFECTANTS
FLY SPRAYS, INSECTICIDES
RUST REMOVERS
CLEANING PRODUCTS AND DETERGENTS

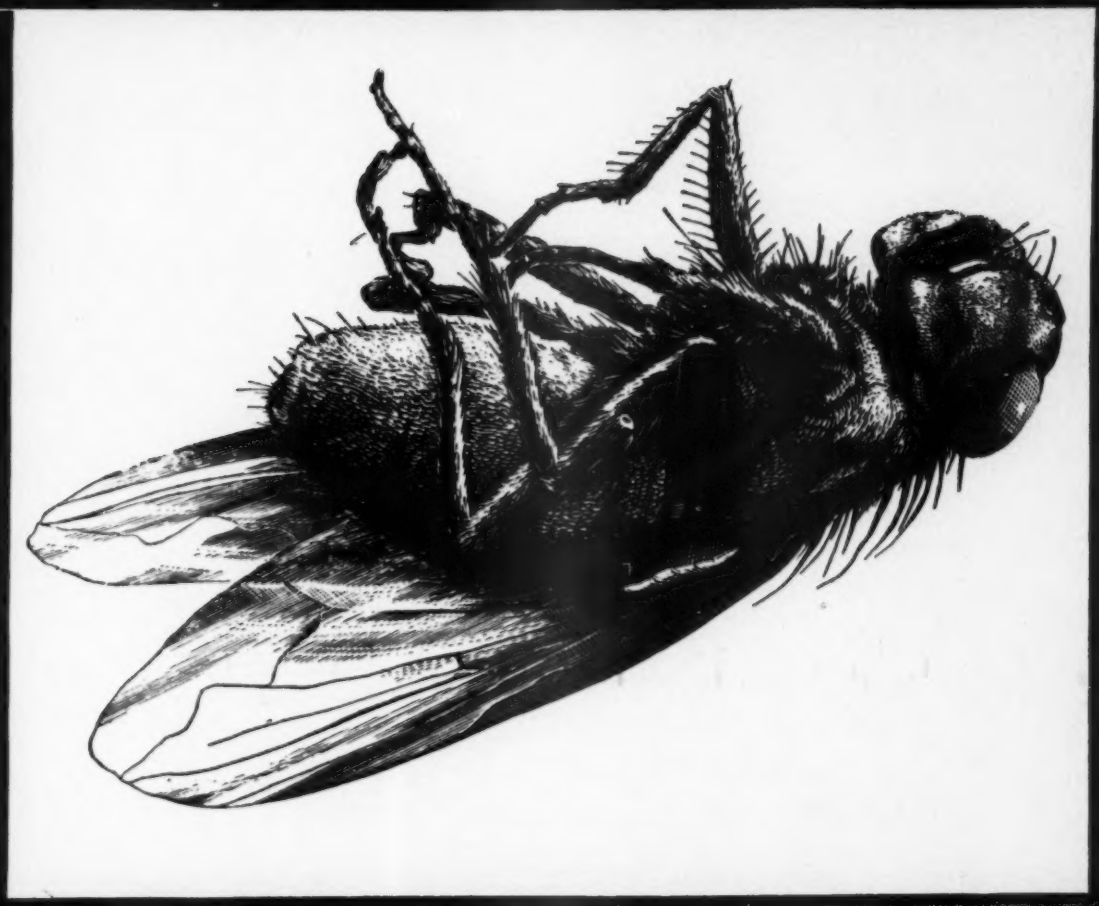
Chemicals
ACIDS AND OTHER INDUSTRIAL LIQUIDS

Foodstuffs
Poly-Tainers are suitable for many foodstuffs. Please consult Metal Box about food packaging in Poly-Tainers.

55/05


OPTICALLY CLEAR
One of six Metafilters in stainless steel supplied to Messrs I.C.I. Ltd. in connection with Nylon production.
Metafilter

THE STAVELEY IRON & CHEMICAL CO. LTD. NR. CHESTERFIELD



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For details of the finest dewaxed, non-staining and rapid insecticides for domestic, industrial and horticultural sprays and aerosols, write to:

CITROPAL® contains the identical proportions of only those components which we found to be in terpene- and sesquiterperteless natural lemon oil.

CITROPAL® combines the full pure odor and flavor with the stability, uniformity, availability, economy and other advantages of synthetic products.

CITROPAL® is particularly recommended:

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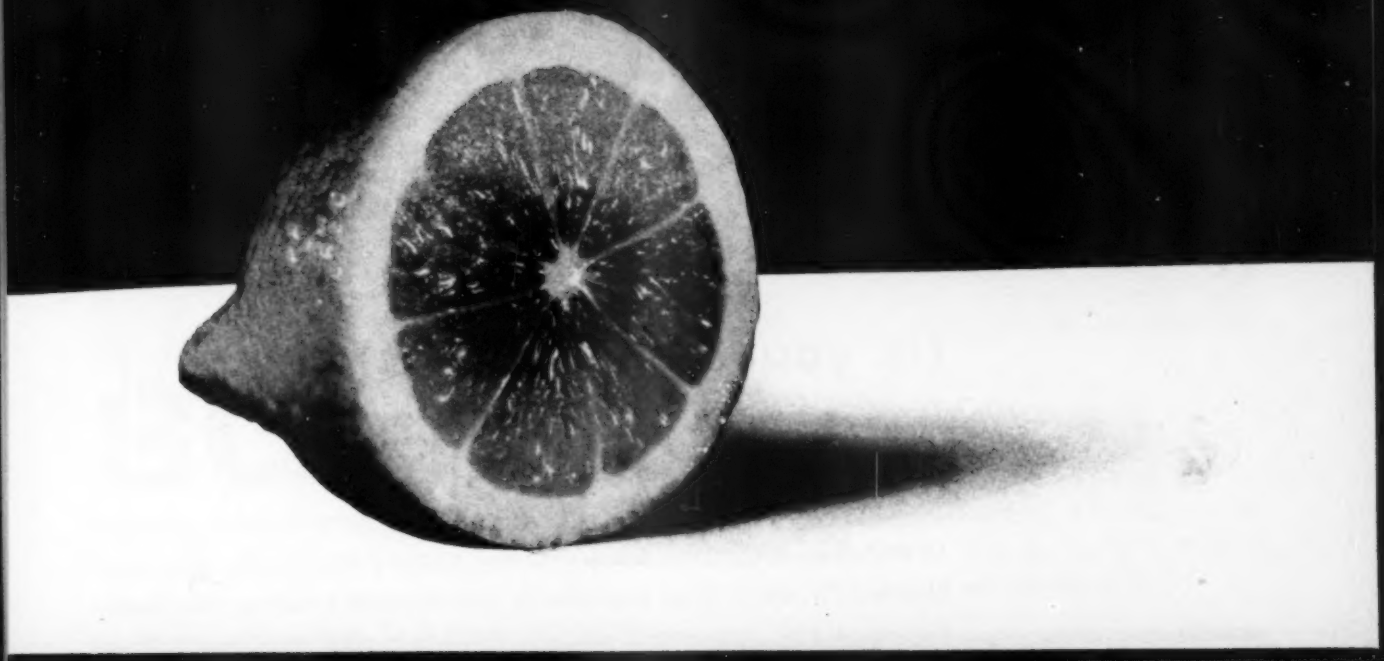

Note further details and suggestions from our data sheet

OLD ?

(is your bottleneck showing?)

A bottle, stark and simple, is not the most inspiring sales promoter. And yet the fact is that a large quantity of pharmaceutical products contained in bottles and jars are offered at the point of sale without the benefit of a carton. This immediately puts them at a selling disadvantage compared with competitive products which are attractively cartoned and often displayed on the same shelf.

Reed PAPER GROUP

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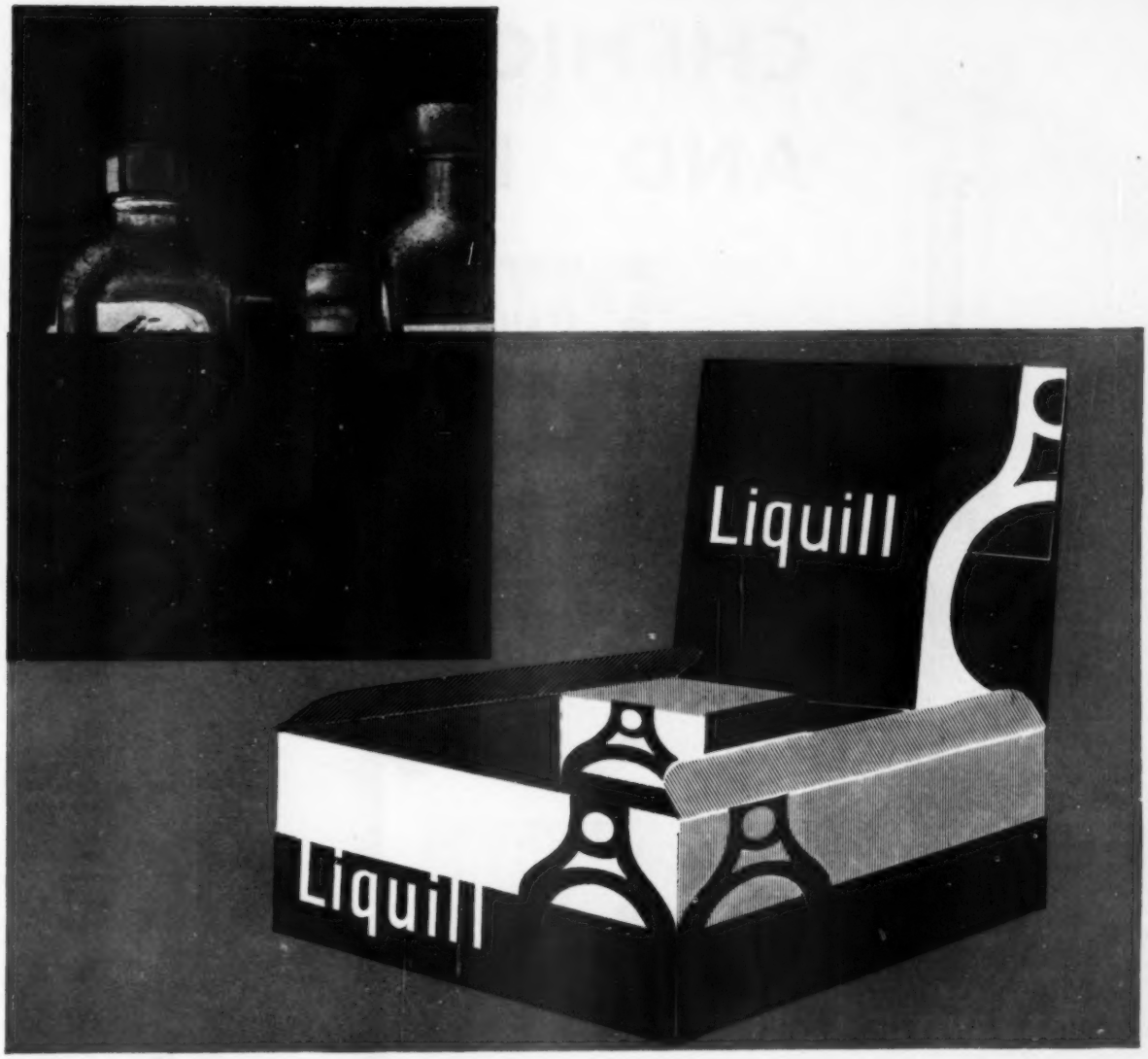
In the South : **CROPPER & COMPANY LIMITED**
Thatcham, Nr. Newbury, Berkshire. Telephone: Thatcham 2235

In the North : **CUT-OUTS (CARTONS) LIMITED**
Grantham Rd., Newcastle upon Tyne 2. Telephone: Newcastle upon Tyne 2-9806



SOLD in a Reed Carton

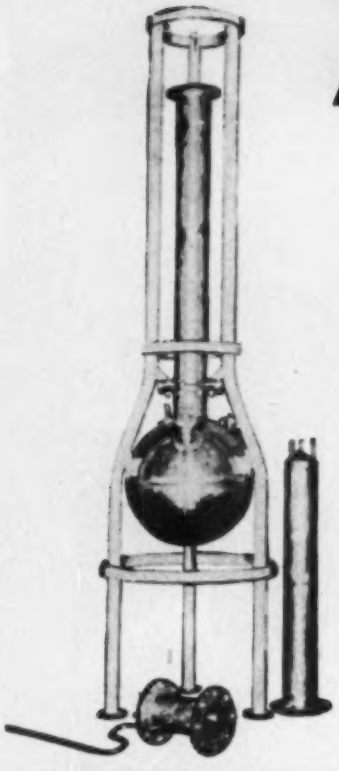
A Reed carton is designed to sell. It fits in with your other promotional activities, gives immediate product recognition and overcomes increasing competition. It is produced to fine limits for machine filling and is expertly printed. It protects your product, proclaims its presence from shelf and counter, helps the retailer in matters of easy stacking and display and provides the opportunity for enclosures, both instructional and promotional.

The Reed Carton Division has for many years served the needs of the pharmaceutical industry and includes amongst its customers such well known companies as Beecham Pharmaceuticals Ltd., Reckitt & Sons Ltd., E. Griffiths Hughes Ltd., and Winthrop Laboratories Ltd.

The Reed Carton Division would appreciate the opportunity of quoting for *your* cartons, or submitting suggestions for any of your packaging requirements. For further details of the facilities of the Reed Carton Division, please write for Publication No. R/200.

RC7

CHEMICAL PLANT AND EQUIPMENT



25 gallon S/S Still specially designed for the Essential Oil Trade, unit complete with Column Condenser, etc.

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- STANDARD OR SPECIALLY MADE
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- PROMPT DELIVERIES
- ANY SPECIFICATION

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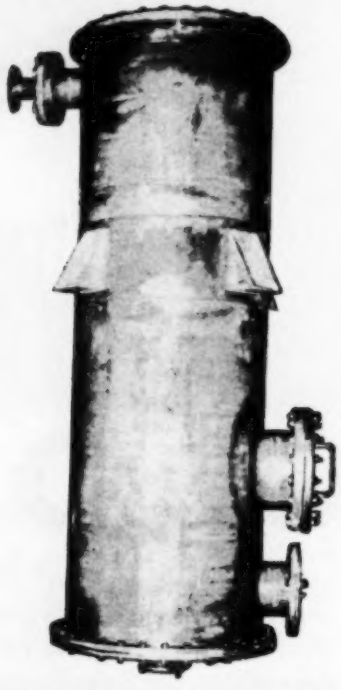
- DUCTS & PIPEWORKS OF ALL KINDS



Copper Fractionating Column built specially for a leading Chemical Manufacturer in 10 days, complete with Plates, Bubble Caps, and Risers.

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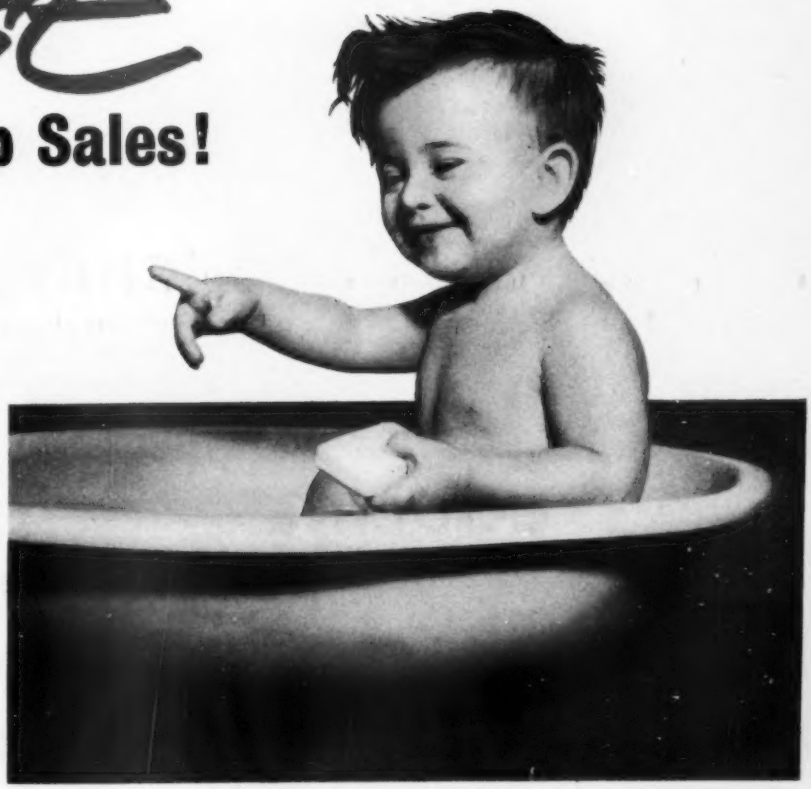
STALCO WORKS · LIVINGSTONE ROAD · STRATFORD · LONDON · E.15

Telephone: MARyland 5818 (3 lines)

Wholly advantageous in TOILET SOAP

Let LORAMINE *Boost* *your* Toilet Soap Sales!



For the first time, here is an additive (patents applied for) that improves all the desirable properties of Toilet Soaps, without detracting from any one other property.

Perfume Fixation—LORAMINE powerfully fixes even the light, floral odours—in the tablet and on the skin.

Perfume Intensity—LORAMINE boosts the intensity of the perfume as well, so that major economies are possible.

Foam Stability—LORAMINE boosts lather formation speed and duration.

Skin Protection—LORAMINE provides a protective, silky-smooth film over the skin of the user.

Emollience—LORAMINE gives every toilet soap the smoothness, softness and creamy feel of a baby soap.

Improved Cleansing—LORAMINE actually improves the detergency of soap, yet it acts as a super-fattening agent.

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Queries and Service:
The overwhelming advantages of using LORAMINE in toilet soap have been established internationally. Problems of incorporating the additive in soap have been resolved on pilot plant as well as on large-scale levels. The importance of LORAMINE in soap manufacture is such as to justify application for world patents. Requests for technical data and information should be addressed to the Company—the sole inventors and manufacturers of LORAMINE.

✻ **LORAMINE** is the registered trade name for products by

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Specialists and world pioneers in alkylolamides
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Official preparations of Cascara Sagrada, including Dry Extract B.P., Granular, for the manufacture of tablets.

CHRYSAROBIN

Chrysarobin B.P.C. 1949 – large or small quantities offered at keenest rates.

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Codeine Phosphate Special (Smith) is recognised throughout the world as the Codeine of choice for the manufacture of tablets.

ESERINE

Alkaloid, Salicylate and Sulphate available in all sizes of packs from 1 grain upwards. Quotations on request.

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Pethidine Hydrochloride B.P. for the preparation of injections and tablets. Offered subject to D.D. Regulations.

T & H SMITH LTD BLANDFIELD CHEMICAL WORKS EDINBURGH 11

this baby was a headache . . .

. . . until we designed the most successful

"ONDULA" *ampoule box*

No more broken ampoules! Manufacturers will be attracted by this new scientifically designed pack which provides an adequate safeguard against breakage of ampoules, glass vials, thermometers and similar fragile products. The "Ondula" ampoule pack is supplied either as a hinged lid rigid box, or shell and slide and is designed for ampoules 1, 2, 5 and 10 M.L. capacity glass vials, thermometers, etc.

This inserted drawing shows how each ampoule is gripped over more than half its circumference by utilising the natural grain of the board which allows flex and acts as a spring clip. Ampoules cannot fall out even when the pack is held upside down.

See our display at the Packaging Centre, 50, Poland Street, W.1.

Sole manufacturing rights in Great Britain held by

Robinsons *of Chesterfield*

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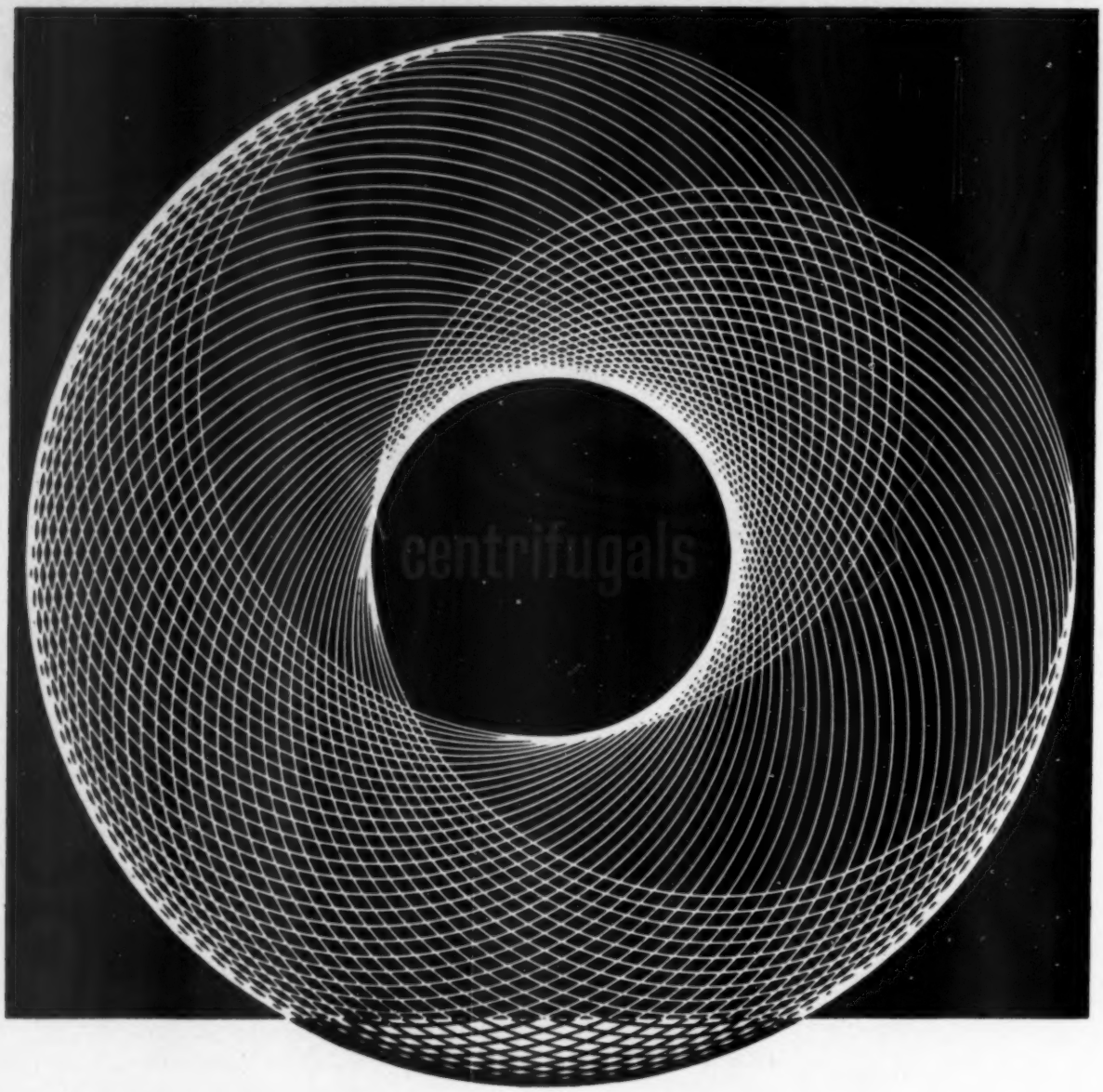
London Office: King's Bourne House, 229/231 High Holborn, WC.1. Telegrams, "Omniboz" Hold. London. Holborn 6383.



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have a wide range

of centrifugals

for the chemical industry

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Monsanto

Monsanto ASPIRIN

outsells all others, because–

1. the quality is consistently high
2. it is available in crystals for direct tabletting—eliminates slugging and wet granulation
3. it is available in a number of grades — to suit every formula
4. Monsanto are the *only* U.K. manufacturers of Phenacetin — so buyers obtain both chemicals from the one source.

Monsanto also make these chemicals specially for your industry: Methyl Salicylate B.P. Salicylic Acid B.P. Salicylic Acid (technical). Vanillin B.P. Sodium Salicylate B.P. Phenol B.P. Salicylamide Sodium Benzoate B.P. Benzoic Acid B.P. Phenolphthalein B.P.

Write today for more information.

Monsanto chemicals help industry – to bring a better future closer

Monsanto

Regd.

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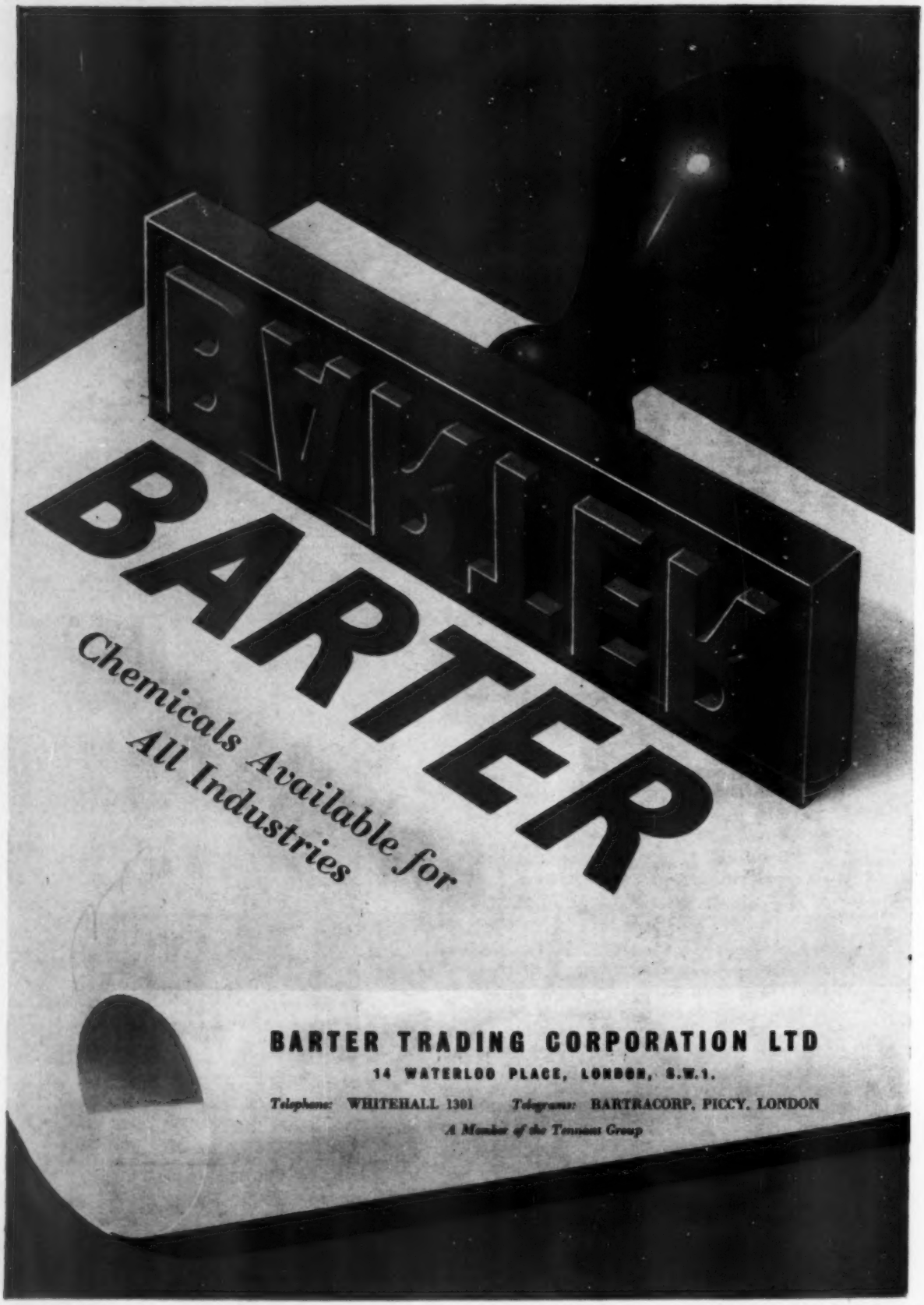
519 Monsanto House, Victoria Street, London, S.W.1 and at Royal Exchange, Manchester, 2.

In association with: Monsanto Chemical Company, St. Louis, U.S.A., Monsanto Canada Limited, Montreal, Monsanto Chemicals (Australia) Ltd., Melbourne, Monsanto Chemicals of India Private Ltd., Bombay. Representatives in the world's principal cities.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in various structural materials

Distillation columns, solvent recovery plant, autoclaves, expansion joints and many other specialised process-plant items—Dore have the experience and the skill to manufacture welded plant of the highest standard, for delivery at the right time, at the right price.

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GET A Keen QUOTATION FROM—

JOHN DORE & CO LTD

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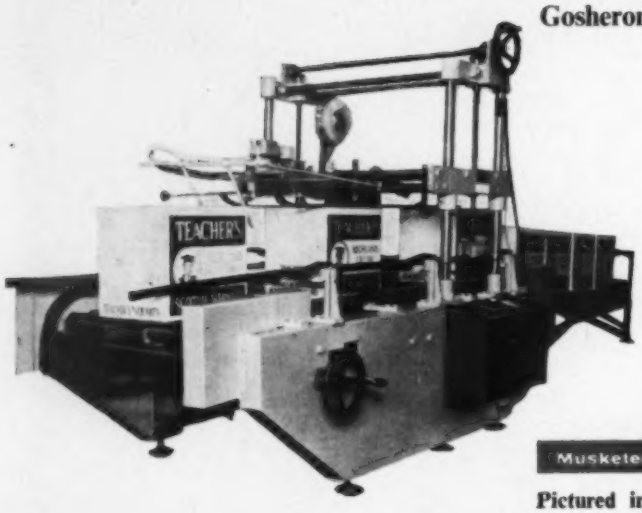
FOR ALL CARTON SEALING

Gosheron have the

INTRODUCING The Three Musketeers—

Gosheron's NEW Automatic Carton Sealing Machines



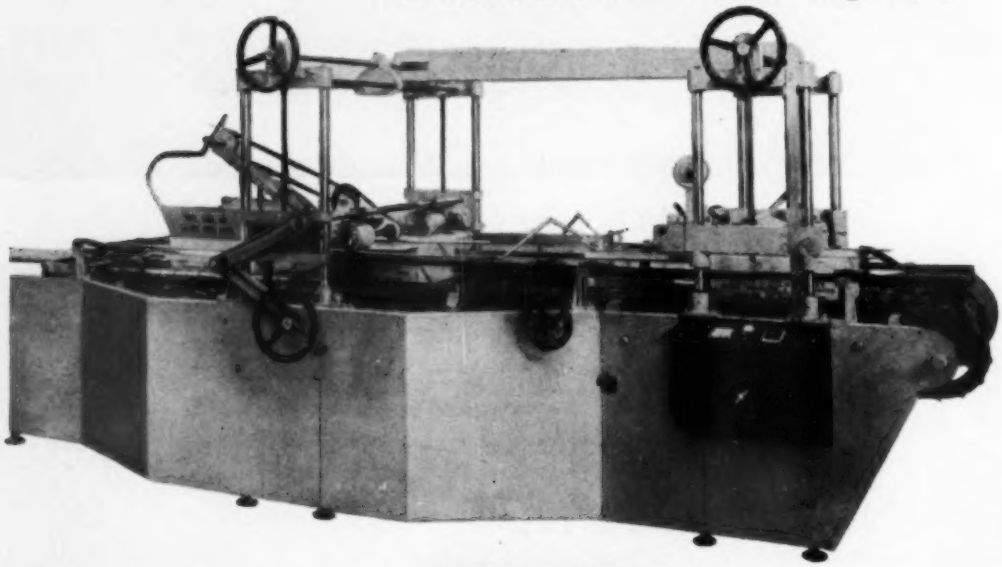
All accommodate a wide range of carton sizes.

Quickly adjustable for carton sizes.

Automatic indexing mechanism for easy flow.

Hot wire device for clean, straight cut.

Musketeer Mark I **7′ 6″ x 4′ Taping unit only.**
Pictured in use at William Teachers' Glasgow Bond.



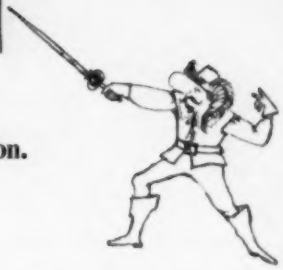
Write for further details.

Musketeer Mark II **14′ 4″ x 5′ 6″**
Prototype flap glueing and taping machine.

Gosheron 50 YEARS *leaders in tape technology*

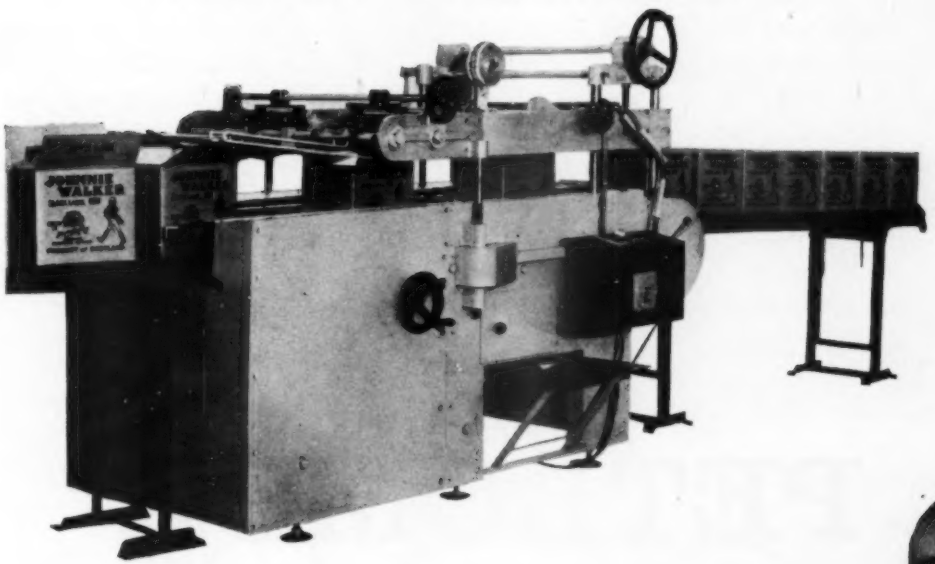
John Gosheron & Company Limited, The Packaging & Industrial Tape Centre (Regd.)

automatic answer



Gosheron's 5-Star VINYLPRINT has been perfected for speedy efficient and automatic application.

- ★ **Self-adhesive P.V.C. based, it is impervious to moisture.**
- ★ **Revolutionary process provides a protected print.**
- ★ **Special 'Trial C' adhesive ensures smooth running through the machine.**
- ★ **New 'NON-EASY-TEAR' properties prevent snapping.**
- ★ **All for no extra cost—reduced prices for bulk quantities.**



Musketeer Mark III **8′ 4″ x 4′ 3″ The latest space-saving combined glueing and taping machine. Pictured in use at Johnnie Walkers Kilmarnock Bond.**

Seen here toasting his many trade friends is Mr. R. A. Goodwin, Gosheron's Area Manager for Scotland, D'Artagnan to the Three Musketeers and the first salesman to pioneer self-adhesive tapes to the Scotch Whisky Industry.

Patent Hand Carton Sealers also available

Gosheron *can tape it*

All these machines can be demonstrated in Scotland
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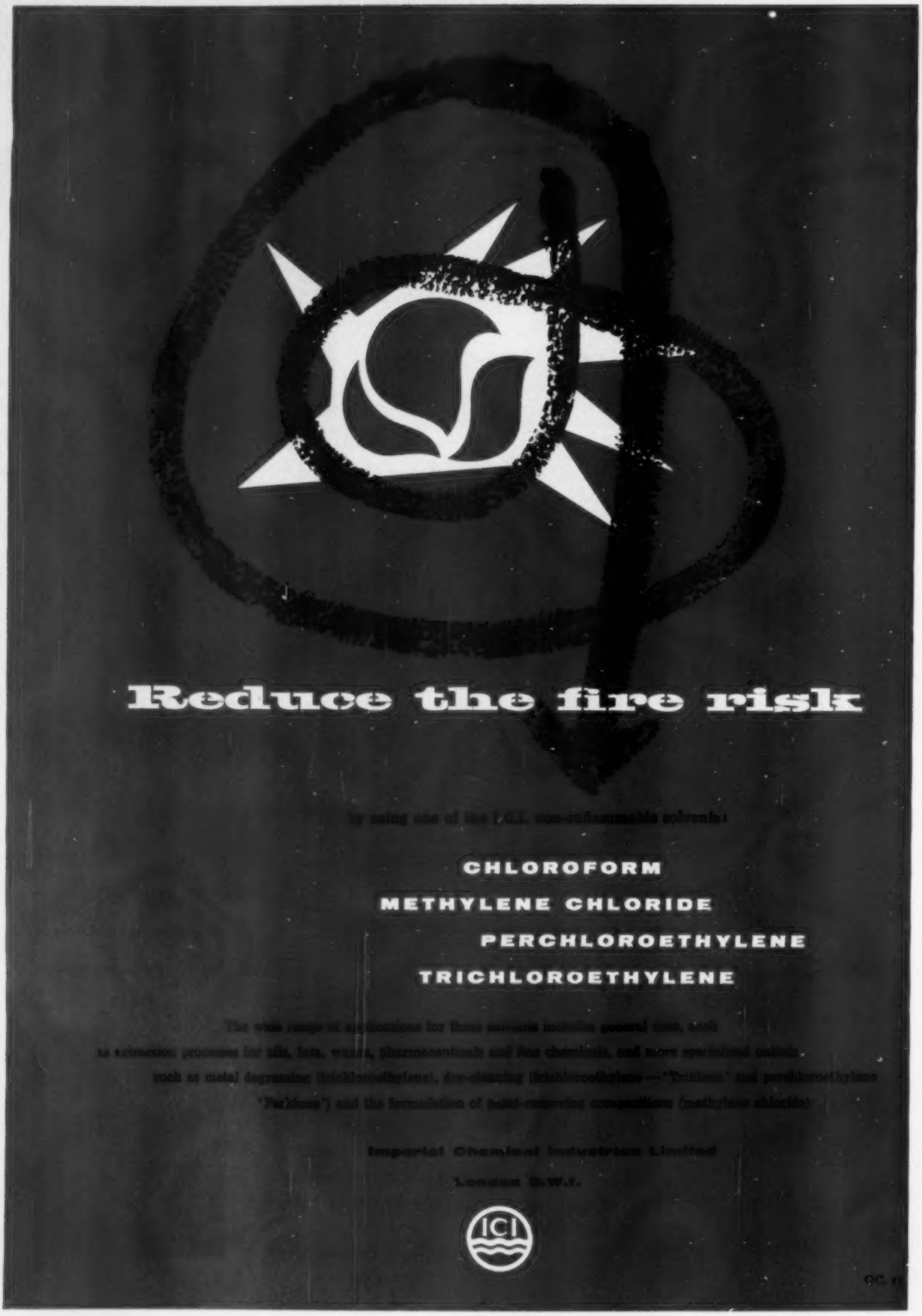
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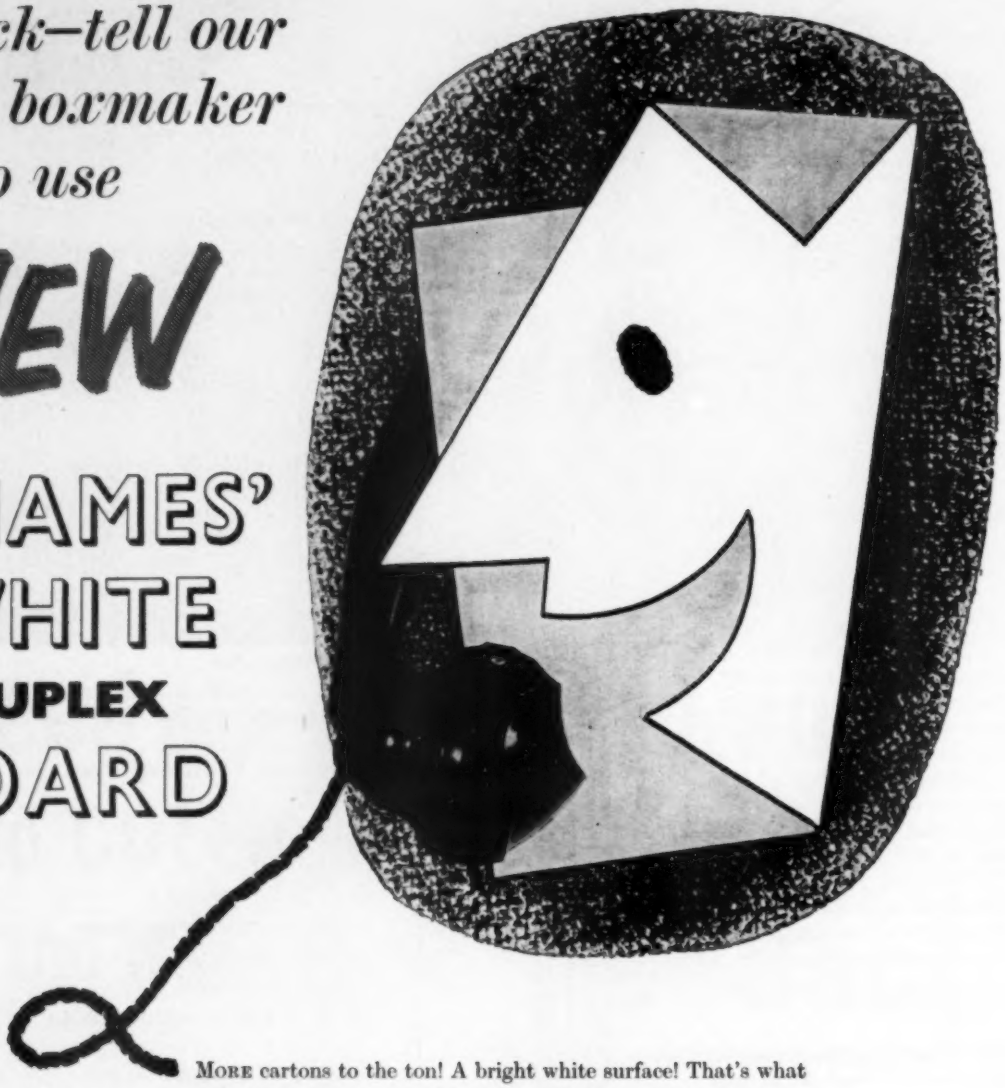

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TOPICS AND COMMENTS

U.S. research in Britain

BY THE autumn yet another American pharmaceutical company will have research laboratories operating in this country. As reported in our February issue, Smith Kline and French are building laboratories at Welwyn Garden City. Part of these premises will be occupied by the new Smith Kline and French Research Institute.

This is an impressive name. What does it mean? We asked Dr. Gordon Hargreaves, who is a physician and who used to work for Evans Medical Supplies Ltd. He is now assistant to the research director designate, Prof. W. A. Bain, who will on March 31 resign the chair of pharmacology he has held at Leeds University since 1946, to take up his new job.

Dr. Hargreaves told us that the unit at Welwyn will be an entirely autonomous research group, carrying out fundamental work to find pharmacologically active compounds. The programme will be devised by Prof. Bain and his chief colleagues. There will be no detailed direction or timetable from Philadelphia, the SKF headquarters. Promising compounds will be given both to SKF Laboratories Ltd. in England and to the headquarters company.

There will be frequent consultation between the British team and their American counterparts to avoid duplication of research and to exchange data and ideas.

The establishment of this institute, under the direction of a distinguished British pharmacologist, and staffed by British scientists, is an expression of SKF's high regard for British pharmacological and physiological research, a regard shared by other American companies.

Mr. Walter Munns, President of SKF, has said, "We feel that whereas U.S. programmes may be particularly strong in some areas—as one example, the screening of compounds for physiological activity—our research colleagues abroad are particularly strong in complementary scientific disciplines—in this instance, basic physiology *per se*. But beyond strengths in individual scientific disciplines is the matter of scientific philosophies, which also differ—slightly, but significantly. Therefore, if we can share not only strengths but, in addition, exchange philosophies, both the American and British research functions will be enriched whether or not any specific products are developed as a result of the institute."

Usually when the Americans employ British scientists it involves their working in the U.S. In this case the Americans are investing in British scientists in Britain and they are assuming that if they pick the right men the results will follow without detailed direction.

What lines the research will take at Welwyn can only be guessed at. Prof. Bain is perhaps best known for his work on the autonomic nerves, on adrenaline, and on the antagonists of histamine. Although SKF are heavily involved in psychopharmacological compounds, either tranquillisers (*e.g. Thorazine*) or nervous system stimulants (*Benzedrine*, etc.)—these groups of products accounting for 70% of sales in 1957—their scientific interests have never been limited to drugs in this field and their research programmes cover a wide range of medical science.

How British firms are handicapped

THE establishment of a fundamental research organisation by an American company marks another step in the steady consolidation of dollar investment in the British pharmaceutical industry. As Dr. J. H. Dunning pointed out in his book, "American Investment in British Manufacturing Industry" (reviewed in our September issue, p. 865), now only seven of the 24 U.K. companies specialising in ethicals are British owned. This number may shrink still more.

The American invasion springs from the great prosperity of the U.S. pharmaceutical industry, which enjoys a huge home market buoyed up by the American public's willingness to pay appreciably more for drugs and medicines than the British. The British market, dominated by the N.H.S., can never be as profitable as the American. It is therefore pointless to complain about the ascendancy American firms are establishing over here. We cannot have cheap drugs and a booming industry. No more can we hope to compete with the American research effort. Because they make good profits the Americans can pour huge sums into research and development. Smith Kline and French alone employ over 700 on research and development and last year spent $10·4 million for this purpose. This must be getting near to the total research budget of the British industry.

Successive governments, Labour and Conservative, are responsible, through the N.H.S. price policy, for curbing the research potential of the British pharmaceutical industry. And now American firms are utilising British research skills. If cheap drugs are a political necessity, will the government make amends by giving British firms research funds by tax concession and/or by providing more money for research by the Medical Research Council, research institutes and the universities?

Anatomy of an accident

EVEN in the best managed factories accidents happen, not necessarily because of the carelessness of one person but often because of the slight failings of many. Safety can only be ensured by the conscious and sustained effort of all concerned, from managers down to the humblest employees. This is the message of I.C.I.'s latest safety film "The Human Factor." It is a well-produced colour film which opens dramatically with an accident in which a man is seriously injured by a fall from a large stack of drums which collapses when a chock is knocked away by a passing truck. In a series of flashbacks the history of the accident is unfolded and it is shown that a number of people have unconsciously contributed to the disaster. It is shown how honest thinking and plain talking after an accident can do a great deal to reduce future hazards.

Colour films are not cheap to make and "The Human Factor" is further evidence of I.C.I.'s determination to inspire its employees to persist in safety thinking and safety working. By films, demonstrations, lectures and instruction of all kinds the company has cut its accident frequency rate since 1946 from 3 per 100,000 hours' work (the normal working life of an individual) to 0·441. The present target is a frequency rate of 0·25. If achieved it would mean that during their working life only one employee in four would be likely to have an accident.

I.C.I. are making the film available to other firms. It is hoped it will get a wide showing, for the safety principles it publicises are universal.

An opportunity to sell pesticides

THE multiplication of chemical weapons against weeds, insects and vermin is a triumph for pest control scientists. Never before have so much money and so many facilities been deployed against the forces which rob men of food in the field and in store, attack other economic crops, destroy timber, and generally cause havoc wherever they are allowed to flourish unchecked. These achievements also testify to something else: the existence of the biggest ever market for crop protection and pest control chemicals, equipment and services. Prosperous farmers realise that the skilful employment of these chemicals and tools helps them to stay prosperous. More is being spent on public health than ever before. Industry is attacking pests—from rats to weeds—as never before.

Against this background nothing but good can come from the 1959 Crop Protection and Pest Control Exhibition. It is being held in the Seymour Hall, London, W.1, from December 9 to December 11. Thus it will coincide with the Smithfield Show, when thousands of farmers will be in London. But, of course, it will attract many other people interested in the subject—market gardeners, public health officers, stores supervisors, foresters, etc.

The Exhibition is a fine opportunity for promoting the sale of crop protection and pest control chemicals, and those of our readers who are in this market should make immediate enquiries about stand space. We understand that an attractive shell scheme has been prepared by the organisers, the monthly journal *World Crops*. The idea is to enable exhibitors to participate with the minimum of trouble and expense.

There have been complaints that there are too many exhibitions. But specialised shows like the Crop Protection and Pest Control Exhibition really simplify exhibitors' problems. The very nature of the show ensures that the overwhelming majority of visitors will be interested in crop protection and pest control. Thus the chances of idle enquiries are substantially reduced.

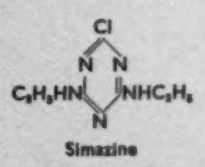
Full details of space available are obtainable from the Exhibition Organiser, Leonard Hill House, Eden Street, London, N.W.1 (phone Euston 5911—ten lines).

Total weedkiller

MOST new weedkillers introduced in the past 20 years have selective action. Their ability to discriminate between weeds and useful crops—from grain to grass—is their chief advantage and without doubt they contribute enormously towards cleaner crops and higher yields.

The latest weedkiller is not selective. It totally destroys all green vegetation. Its introduction is a reminder that there is a market of considerable promise for such a product. The railways are constantly preoccupied with keeping tracks and sidings clear of weeds. Oil installations, pipe tracks, storage areas, car parks, fire breaks and many other industrial sites have to be kept weed free. Factories generally are neater and better maintained than ever before, so here again is a market for a total weedkiller.

The new chemical is simazine, one of the triazine group of herbicides discovered by Dr. Hans Gysin of J. R. Geigy in Basle. It is 2-chloro-4,6-bis (ethylamino)-s-triazine. Its chief characteristic is extremely low solubility in water—only 5 p.p.m. This argues great persistence of action and, indeed, simazine is reputed to remain in the surface layers of the soil, continuing to prevent invasion by new weeds after the existing ones have been killed, for periods up to a year. The makers recommend using simazine in the spring, when weeds are sprouting. This avoids leaving a mass of dead vegetation which is both unsightly and a fire hazard. If applied each year in this way, simazine is reputed to keep areas free of weeds all the year round.



Simazine

The weedkiller is applied with plenty of water—at least 100 gal. per acre—at the rate of 80 to 40 lb. per acre. The aim is to drive it down to the roots,

where it is absorbed into all parts of the plant. It shows little or no herbicidal action through the leaves. Exactly how simazine works is not yet known, but it is thought to disrupt the vital process of photo-synthesis.

It is natural to compare the new product with sodium chlorate. It is considerably dearer than this well-tried chemical, costing from 40s. to 29s. per lb., according to quantity. On the other hand, it is reputed to be more effective than sodium chlorate; one pound of simazine is thought to be the biological equivalent of 20 lb. of chlorate. Furthermore it is non-toxic, non-corrosive and non-flammable.

Simazine has been introduced in Britain by Fisons Pest Control Ltd. It is one of the first important fruits of the Fison-Geigy agreement on the world-wide marketing of pesticides. Another British distributor, Shell Chemical Co., has also been appointed. The Fisons product is called *Weedex*. Shell's is called *Shell Total Weedkiller*.

Attack on saccharin

THE soft drinks industry and its suppliers have been outraged by the report on its products made last month by the Food Standards Committee. Two proposals that are found particularly objectionable are that the use of saccharin should be prohibited, except in diabetic drinks and that the term "glucose" should be forbidden in the labelling and advertising of soft drinks, as well as any form of testimonial or nutritional claim based on the carbohydrate content.

The British Saccharin Sales Co. Ltd., jointly owned by Boots and Monsanto, promptly protested that the Committee had given a totally false impression of the function of saccharin in soft drinks. "Saccharin" they say "is not used in soft drinks as a substitute. It makes its own contribution to the refreshing nature of the drink. Its effect is to add a clean, sweet taste without increasing the body of the drink." Drinks sweetened entirely with sugar would be too syrupy and less thirst quenching.

It is natural that the saccharin makers should attack the Committee's proposal, for the soft drinks industry takes 60% of its output. There is, in fact, only one maker of saccharin in this country, namely Boots. According to Customs and Excise returns, in the year to March 1958, 5,463,831 oz. of saccharin were produced in this country of which 249,608 oz. were exported. On this total the Government collected £1,422,742 in Excise duty which, after the drawback allowed on the exports, gave a net total of £1,857,740. Imports of saccharin are negligible; only 1,432 oz. came in during 1957-58 on which a duty of 7s. 6d. per oz. was collected.

There is only one maker of saccharin in Britain, presumably because no one else finds it worth while. In fact, though its manufacture is a monopoly, the price of bulk saccharin has risen only 22% since 1939, while the price of saccharin tablets has gone down from 8d. to 6d. per 100.

It seems that custom and taste have established a good case for the continued use of saccharin in soft drinks, though limits might well be set. Certainly the Government will consider the situation very thoroughly before accepting a proposal which would drastically curtail the saccharin industry. If saccharin were prohibited, it would cost the soft drinks industry from £2·4 million to £3 million a year to replace it, leading to an increase of up to 2d. a bottle on a concentrated drink.

The proposal to abolish the word "glucose" is condemned as "nonsensical" by Mr. H. G. Lazell, chairman of the Beecham Group, makers of *Lucozade* and, since their acquisition of the *Corona* business of Thomas and Evans, the largest makers of soft drinks in Britain. He argues that over 80% of doctors last year prescribed various forms of glucose. Denying that his company ever made exclusive claims for glucose as the sole source of energy supply, Mr. Lazell concludes that "To forbid well-supported and objective claims is surely to rob the reputable manufacturer of his right to tell the public the truth about his products."

Plastic packaging boom

WITHOUT doubt the companies which are investing huge sums in building more and more capacity for plastics manufacture are looking to packaging to absorb a great deal of the vastly increased output. The trend is obvious from the most cursory inspection of the shops. Polythene in particular, in which most current investment is being poured, is proving its versatility in a thousand ways.

C. H. Bulmer, of the research staff of the Printing, Packaging and Allied Trades Research Association, forecast that the movement from glass to polythene carboys and from metal to plastic-coated drums would accelerate, when he spoke to the Plastics Institute in Leicester last month. He pointed out that the fibreboard drum had already deeply penetrated the steel drum market and that as coating techniques improved polythene-coated fibreboard drums would become available. There would, he said, be square fibreboard drums as well.

At the other end of the scale, moulded plastic containers were set to make inroads in the small carton field, particularly for packing food and powders. High density polythene would provide better plastic bottles and carboys.

Paper sacks which have now largely ousted jute and hessian sacks would themselves be replaced in time by polythene sacks. This might happen in less than ten years, according to Mr. Bulmer.

Outlining the ways in which plastics were being increasingly used to provide protection against damage, Mr. Bulmer said one of the great advantages of plastics was the protection they afforded against the various climatic hazards. By selecting

the appropriate material almost any degree of protection against moisture, in the form of liquid water or vapour, could be obtained.

Mr. Bulmer pointed out that while "visibility of product" was an advantage often claimed for plastics, this very property could also raise problems, as many products containing fats tended to go rancid if exposed to light, particularly in the ultra-violet region of the spectrum. If plastics were used for packaging these commodities, they must be coloured, or else the material selected must have a low ultra-violet transmission rate.

No plastic material provided a good food source for insects, but there were instances of wrappers and some plasticisers supporting mould growth.

On the subject of mechanical damage, Mr. Bulmer referred to the hazards of transport in the various systems of distribution. Plastics were used extensively for protecting against shock and he described the research being carried out at PATRA on the study of the properties of cushioning materials.

On the general application of plastics in industry, Mr. Bulmer thought speed on the packaging line was the most essential factor. Three years ago 250 packs per min. was considered "pretty fast"; in another three years he thought that 1,000 per min. would be quite common.

Inspired analyst

BORN 250 years ago, on March 8, Andreas Sigismond Marggraf was an exceptional analyst for his day. The son of the royal apothecary in Berlin, Marggraf worked in pharmacies in Berlin, Frankfort and Strasbourg, and later studied medicine and metallurgy at Halle and Freiberg. This dual rôle fitted him throughout his career, and he made a series of discoveries in both organic chemistry (in the older sense of the subject) and in metallurgy.

Early in his many researches he studied "the phosphorus cycle" in plants. After failing to find other organic matter, animal or vegetable, a superior source of phosphorus, Marggraf showed how sodium ammonium phosphate could be reduced to phosphorus, a decisive step in his work on phosphoric acid and phosphates. He was so painstaking that he prepared phosphorus from mustard seed, cress and wheat, as part of his studies on vegetable or plant chemistry.

Although Martin Klaproth is held to have been the most distinguished analyst of his day, Marggraf was more versatile in his discoveries made half a century earlier. Marggraf extracted zinc from calamine, worked on platinum and mercury, and showed how fluorspar heated with sulphuric acid evolved an irritating gas which etched glass. In his day fluorspar was confused with barium sulphate, while "earths" like magnesia and alumina were also undifferentiated. Marggraf demonstrated the properties of alumina and other bases, distinguished between soda and potash and noted the yellow and lilac flame tests for their compounds. He prepared pure saltpetre from salt, analysed heavy spar or barytes, and fully earned the title of "second father of European analytical chemistry." He was also an inspired teacher during his fifty years of chemical research.

In bringing the microscope into use in chemistry Marggraf unwittingly made a decisive study, namely, on the presence of sugars in carrots, turnips, parsnips—and in beet. His tiny crystals, found in better yields in white beet, were the beginnings of a great industry, just as the tiny beads of silvery metal prepared by Charles M. Hall created the modern aluminium industry. Marggraf had been extracting potash from vegetable matter, and on finding sugar crystals turned to this new field. Using cannon-proof brandy he extracted only $\frac{1}{4}$ oz. of sugar from $\frac{1}{4}$ lb. of dried beet, a first step in beet-sugar history. In 1747 he published his "Expériences chymiques faites dans le dessein de tirer un veritable sucre des diverses plantes," a classical memoir.

Marggraf died in Berlin on August 7, 1782. His pupil Franz Carl Achard (1753-1821) persuaded Frederick William III of Prussia to finance sugar-beet cultivation, beet-sugar factories and a sugar technology school.

Better than morphine?

CLAIMED to be ten times more potent and considerably safer than morphine, a synthetic analgesic derived from coal tar is now undergoing trials in the United States. Developed by Drs. E. L. May and N. B. Eddy, of the National Institute of Arthritis and Metabolic Diseases, the drug is known as NIH 7519 and is said to give relief of post-operative pain in doses of 1·5 mg. for 90% of the time as opposed to a 10 mg. dose of morphine required to give relief for 75% of the time.

The product is 2′-hydroxy-5,9-dimethyl-2-(2-phenylethyl)-6,7-benzomorphan. It was developed by Dr. May in his attempts to produce a molecule with the analgesic powers of morphine but without its addictive properties. However it is not free of the addiction hazard and the National Research Council's Committee on Drug Addiction and Narcotics has recommended that it be brought under narcotics control. The patent rights were assigned by Drs. May and Eddy to the Government, which will license the manufacture and distribution.

The new drug is stated to produce significantly fewer side effects such as respiratory depression or excessive sedation, and for this reason may be of particular use in obstetrics. It may also be effective in cases of severe nerve pain not relieved by other drugs, as it appears to maintain full effectiveness for three weeks without the need for increased dosage. In short-term experiments with volunteers the drug is said to have produced "a significantly milder withdrawal syndrome," so it may be less addictive than morphine.

Formulation of Aerosol Insecticides

By Wm. Mitchell, B.SC., PH.D., F.R.I.C.*

Aerosol insecticides are primarily used to control houseflies and other flying insects encountered indoors and for this reason they almost always contain pyrethrum besides DDT or Lindane. It is this type of formulation that Dr. Mitchell discusses, covering such practical considerations as choice of ingredients, propellants and container components.

IN THE formulation of aerosol insecticides, as with most compounded products, it is essential, in order to secure optimum results, to pay particular attention to the details of formulation—and only experience can teach what is required. Before proceeding to consider these problems, however, it seems worth while to consider the *pros* and *cons* of aerosol insecticides.

Evidently, aerosol insecticides constitute one of the most useful applications of the technique. In fact, this was the first commercial application; though the aerosol insecticides were initially of the high-pressure type, and thus considerably different from those normally used today. Furthermore, being of the high-pressure type, the term " bomb " was applied to them, a term that has subsequently been something of an embarrassment to the industry, and one that dies hard.

One of the main points in favour of aerosol insecticides is convenience in use—one common to most aerosols. However, it is peculiarly so in this case. An aerosol insecticide container can fit quite unobtrusively into anybody's dining room or drawing room, and be available for instant use without fuss or bother.

This certainly cannot be said of the ordinary hand-operated sprayer. Few housewives will tolerate the presence of one of these on the sideboard, or on the top of the piano! It requires filling, usually at inopportune times; and it normally dribbles on the carpet while being operated. Yet an efficient hand sprayer is highly effective when used to atomise a properly formulated insecticide spray.

However, it is necessary to emphasise that it must be well designed and constructed to give the best results—conditions that are certainly not met by many hand sprayers that are marketed.

* Stafford Allen and Sons Ltd., London, N.1.

A stage in the breeding of houseflies for the biological testing of aerosol insecticides in the laboratories of Stafford Allen and Sons Ltd.

Comparative effectiveness of aerosol and spray

On the other hand, it is often claimed that aerosol insecticides are outstandingly more effective in use; but the present writer, as a result of considerable practical experience and biological testing, does not agree. In place of the claim that aerosol insecticides are more efficient, this experience has suggested that a given quantity of insect toxicants is rather more effective in killing, or in " knocking down," insects when it is disseminated from an *efficient* hand-operated sprayer than when presented as an aerosol. A probable explanation of this is as follows. Because of the relatively high cost of the propellant and of the package, it is only economical to market aerosols containing a much higher concentration of toxicants than that in the usual petroleum-based fly spray. Furthermore, the liquid that will constitute the actual aerosol mist amounts to no more than about one-fifth of the contents of the normal aerosol container, and thus is even more concentrated. It is quite usual for this liquid to have a 60 times greater concentration of toxicants than has the liquid to be used in a hand-operated sprayer; and the total volume of it released each time the aerosol is operated is relatively small. A much larger volume of dilute fly spray has to be emitted from a hand sprayer in order to disseminate an equivalent quantity of toxicants. Thus, even though the droplets are larger and settle out faster than those from an aerosol, there are probably more of them. Hence the chance that an individual insect will be contacted by a toxic dose of insecticide is likely to be greater when a dilute fly spray is disseminated from a hand sprayer than when a more concentrated aerosol is used to dispense the same amount of toxicants. The very fineness of the aerosol spray, and its small total volume, reduce the chance that individual insects will pick up a toxic dose—even though the droplets themselves contain a relatively high concentration of toxicants.

Additional support for this hypothesis has been afforded by comparative tests made with the metered aerosol insecticides recently marketed in the United States. These are some five times more concentrated than the usual aerosol and, by effecting a concomitant saving in propellant, are claimed to be more economical. Experience with them has suggested that this increased concentration results in a further decrease in insecticidal efficiency as compared with the usual aerosol. In practice, one can imagine the user, having failed to see any immediate effect, pressing the metering button repeatedly,

thus nullifying the alleged economy—and still not getting the desired result! This, of course, is a disadvantage even with the aerosol of normal strength; the impatient user tends to be over-generous—but this presumably is good for business!

This somewhat reduced efficiency of aerosol insecticides, as compared with a coarser and more dilute fly spray, is considerably more than offset by convenience of use and application. It can be minimised by careful formulation, which has an influence on the nature of the issuing droplets that is most important; and this will be discussed later in this article. The other disadvantage of aerosol insecticides is their relatively high cost; but this again is largely offset by convenience in use.

For practical purposes, one can almost entirely confine discussion of aerosol insecticides to those used against houseflies and other insects indoors. There is a limited, and perhaps increasing, use of aerosol insecticides in horticulture, and so on; but it seems unlikely that outdoor use of *true* aerosols on a large scale can ever be economic—and it must certainly be wasteful. In any event, the present discussion will be limited to aerosol insecticides intended for indoor domestic use.

Housefly aerosols

Let us consider, therefore, the most common type—that for use against houseflies and other flying insects. This practically always contains pyrethrum, which gives a fast and dramatic "knock down" of flying insects. Certain organic thiocyanates, such as *Lethane* and *Thanite*, which also have "knock down" properties, may also be employed, but they tend to be irritant to the user. *Malathion*, and similar organo-phosphorus insecticides, also have "knock down" properties, but are less safe in use. In short, pyrethrum combines excellent "knock down" properties with virtual freedom from toxicity to warm-blooded animals, and is the "knock down" insecticide of choice.

However, it is relatively expensive, and it is here that the so-called pyrethrum synergists are important. Their use arose from the fortuitous discovery that a given quantity of pyrethrins dissolved in sesame oil had greater insecticidal action than when dissolved in other solvents. It was soon found that this increase was due to sesamin, a constituent of the oil. More recently, another even more active ingredient, sesamolin, has been isolated from it. Chemically these substances both contain methylene-dioxyphenyl groups. A great many compounds containing this structure have, as a result, been synthesised and tested as synergists. Only a few of these have shown real activity, notable among them being "piperonyl cyclonene," "sulfoxide," "sesoxane," "piperonyl butoxide," and "bucarpolate."* Only the last two are in extensive use in the United Kingdom. Their activity in synergising the "knock down" action of pyrethrum is about equal, "bucarpolate" having the advantage of a slightly faster initial rate of "knock down." When used at the rate of 5 parts to one part by weight of pyrethrins, they increase the "knock down" efficiency of the latter by as much as five times. In other words, the proper use of these synergists will permit up to an 80% saving in the amount of pyrethrum required to produce a satisfactory "knock down."

It is in fact to extend the characteristic "knock down" property of pyrethrum that the synergists are of particular value in aerosol insecticides and fly sprays for domestic use. The killing power of pyrethrum in economic dosage is not particularly good. It is true that this also is increased by synergists, but not sufficiently to give the more or less complete kill of insects that is desirable. However, this can be obtained by the use of other, cheaper insecticides such as the chlorinated hydrocarbons, typified by DDT and Lindane; and such materials are nearly always added for this purpose. Pyrethrum has the additional virtue of activating insects prior to paralysing them, whereby they pick up an increased dose of these other toxicants. Unfortunately, houseflies and many other insects are increasingly showing high resistance to chlorinated insecticides; and when adverse reports on the performance of aerosol insecticides and fly sprays are made, it is probably often due to this cause. So far, there has been little evidence of resistance to pyrethrum.

Pyrethrum extracts

One may accept as a typical space spray aerosol insecticide one that contains pyrethrum extract equivalent to 0·25% w/w of pyrethrins; 1·25% w/w of synergist; a chlorinated residual insecticide (*e.g.* 3% w/w of DDT, or 0·1% w/w of Lindane); perfume; solvents; and 85% w/w of propellant, consisting of equal weights of *Arcton* 6 (*Freon* 12)* and *Arcton* 9 (*Freon* 11). It will be useful to consider the various aspects of this typical formulation.

First of all, the pyrethrum extract, which is usually sold with a content of 25% w/w of total pyrethrins, must answer the following requirements:

(*a*) It must be freely soluble and, even after storage, it must not deposit insoluble matter that will tend to clog the valve outlet.

(*b*) It must not stain in use (or perhaps one should say in *misuse*; for in proper use a space spray type of aerosol should not be operated near enough to walls, furniture or fabrics to produce a visible deposit on them. Unfortunately, such misuse is all too frequent).

Hence, a well-prepared and purified extract, and one containing an effective anti-oxidant, must be used. Ordinary pyrethrum extract is rather highly coloured, so that it can stain rather badly if an aerosol insecticide is used incorrectly as described above. Highly purified and decolorised extracts are now available in this country which give practically colourless dilutions that do not stain. Such extracts dissolve completely in the solvents normally used to make aerosol insecticide concentrates, and they are also completely soluble in *Arcton* 9, or in mixtures of *Arctons* 6 and 9, but not always so in *Arcton* 6 alone. This is of no consequence, since the mixture is nearly always used in practice; but it is mentioned because of an unrealistic standard that still exists, and which is sometimes invoked by buyers. This is contained in the W.H.O. Technical Report (Series No. 54, Expert Committee on Insecticides, Fourth Report), published in 1952, and requires that pyrethrum extract shall contain not more than 1·5% w/w insoluble in *Freon* 12. This presumably was of importance

*Made by Stafford Allen and Sons Ltd.

**Arcton* 6 and *Freon* 12 are the British and American trade names respectively for dichlorodifluoromethane, while *Arcton* 9 and *Freon* 11 denote similarly trichloromonofluoromethane.

when the original high-pressure "bomb" type of aerosol insecticide, using *Freon* 12 (Arcton 6), was formulated; but the position is quite different today. It seems high time that this W.H.O standard be rescinded or modified to bring it into line with current and realistic requirements.

The more that pyrethrum extracts are purified and decolorised, the more they tend to become less soluble with age. This may be due to elimination of natural antioxidants in processing. Hence, it is important that efficient antioxidants should be added to prevent such deterioration. Good quality extracts are always so treated by the manufacturers. In fact, trouble due to this cause is less likely to be encountered in aerosol insecticides than in ordinary fly sprays. One reason is that atmospheric oxidation almost certainly plays a part in the changes resulting in decreased solubility; and aerosols, especially those that are cold filled (as is usual with insecticide aerosols), contain little or no residual air. Another reason is that the propellants and the auxiliary solvents in an aerosol insecticide are much better solvents for any material of reduced solubility than are the hydrocarbon solvents, such as deodorised kerosene, used in ordinary fly sprays.

Pyrethrum synergists

Of the synergists, piperonyl butoxide is fairly readily soluble in deodorised kerosene at room temperatures, but the others are less so. This presents no real problem, however, for auxiliary solvents such as methylene dichloride are normally added; and are, in fact, essential when the aerosol insecticides are to be cold filled, as is usual. Evidently the toxicants and solvents are prepared in the form of a concentrate, of which some 15 parts is to be diluted with the propellant to 100 parts by weight. This concentrate must be pre-chilled to −10°C., or lower, prior to loading, and auxiliary solvents are essential to prevent deposition of an oily layer of synergist containing much of the other toxicants dissolved in it. If this were allowed to occur, there would be an obvious risk that some of the containers would receive an excessive quantity of toxicants, at the expense of others which would have a deficiency.

Photo: Stafford Allen and Sons Ltd.

This is what can happen to an aerosol container if too much moisture is present in the formulation; direct rusting or acid corrosion due to hydrolysis of the propellants occurs.

Solvents

The nature of the solvent, or solvents, to be used is most important. Ideally one should use only a high-boiling, relatively non-volatile solvent, such as deodorised kerosene. This would ensure, as the fluid emerges from the jet and the propellant evaporates, that the resultant aerosol would consist of a mist of oil particles. This is the ideal, making certain that the insects are contacted by *fluid* particles containing the dissolved toxicants. Remembering that penetration has to take place through the horny chitinous cuticle of the insect in the main, the importance of this form of presentation of the toxicants is readily apparent.

If one goes to the other extreme, and uses *only* highly volatile auxiliary solvents such as methylene dichloride, the resultant aerosol is more in the nature of a dust. The auxiliary solvent vaporises rapidly, so that the ultimate particles are more or less dry. The only fluid components they possess are the oleoresins of the pyrethrum extract, any mineral oil that it may have contained as a standardising diluent, and the synergist. Such aerosols, as can be expected, are highly inefficient as insecticides. Hence, a careful balance must be struck in formulation, so as to have present only the minimum necessary quantity of readily volatile auxiliary solvents, along with enough mineral oil, or similar high boiling solvent, to ensure that the aerosol consists of fluid particles. Careful attention to this will minimise the inferiority in performance to a conventional spray that was mentioned earlier in this article. In fact, this is one of the most important points to be borne in mind when formulating aerosol insecticides.

Deterioration of components

The possible effect of auxiliary solvents on valve components, plastic dip pipes, and so on, must be carefully borne in mind. In the early days, considerable trouble was experienced with valve failures due to the softening and swelling effects of such solvents on these various plastic parts. This, obviously, is a trouble not confined to aerosol insecticides. Improvements in the nature and composition of these parts have been effected by their various manufacturers, so that such troubles are now minimised. However, even today, care must be taken on this score; and the amount of solvents such as methylene dichloride (one of those most commonly used) should be kept to the minimum necessary, in order to be sure of avoiding trouble. In any event, and as explained above, this is desirable in order to secure the optimum insecticidal effect.

Commercial grades of DDT and similar chlorinated insecticides usually contain some insoluble matter. Hence, the finished concentrate should be freed from this, and any other insoluble material, by settling or by filtration. Failure to attend to this rather obvious precaution may lead to trouble with choked valve apertures.

Care should also be taken to avoid the presence of more than traces of moisture. There is no reason why any appreciable amount of water should find its way

into the initial concentrate. Pyrethrum extract, synergists, and the other materials normally used, are virtually moisture-free. Equally the propellants are more or less anhydrous. The risk of introduction of moisture arises mainly during the cold filling process. The necessary low temperatures, especially during conditions of high atmospheric humidity, provide an ever-present risk of contamination by moisture condensed from the air. The undesirability of the presence of moisture, with its attendant risks of direct rusting of the container, or of acid corrosion due to hydrolysis of the propellants, are very well known. These risks are by no means peculiar to aerosol insecticides, and the subject is mentioned only because the presence of moisture is particularly undesirable in pyrethrum - containing preparations. The active principles of pyrethrum are the pyrethrins and the cinerins. These are esters, and hence they are liable to hydrolysis, if water is present, with complete loss of their activity. Furthermore, they are complex and reactive substances, so that their activity can be destroyed by the direct action of mineral acids, such as can be derived by hydrolysis of the propellants. In fact, experienced aerosol loaders nowadays take such precautions to avoid the entry of moisture into the containers that the risk is small indeed; but it should be borne in mind, particularly when pyrethrum is being used.

Perfumes

Finally, mention must be made of the perfumes normally added to aerosol insecticides. At first sight, one might think that they need little detailed consideration—and one can be excused for believing this. In fact, nothing could be further from the truth. Some of the more common perfume chemicals, including several of those that are normally present in the odour types generally selected for aerosol insecticides, are entirely unsuitable. It has just been mentioned that the active constituents of pyrethrum are complex and chemically reactive. Some considerable time ago it became apparent to the writer that certain perfume mixtures were reacting with the pyrethrins, and more or less rapidly and completely destroying their activity. Realisation of this serious problem led to considerable research into this matter, wherever possible the effects of single perfume chemicals being studied. This work has resulted in the recognition of several perfume materials that are absolutely taboo for this purpose; and information on this subject is constantly being increased. Equally, and more important, it has made possible, from present knowledge, the formulation of perfumes known to be safe for use in aerosol insecticides. The examination of this problem is fraught with difficulties. Deterioration of the pyrethrum-perfume mixture is sometimes apparent by colour and other changes, but this is by no means always so. Furthermore, the changes are often relatively slow, yet rapid enough to provide serious deterioration within the likely shelf life of an aerosol insecticide. Hence, this work can only be satisfactorily undertaken if it is controlled by biological testing to ascertain whether deterioration is or is not taking place. Excellent facilities for such testing are, of course, available to the writer, and have enabled this work to be pursued advantageously. It is certainly most important for formulators of aerosol insecticides to use only perfumes that have been proved safe for their purpose. Quite apart from the adverse effect on business of selling defective, or partly defective, products, it is obviously absurd to include pyrethrum, which is expensive, only to spoil it by using an unsuitable perfume.

Pressure packs and true aerosols

Consideration so far in this article has been devoted entirely to the formulation of the space spray type of aerosol insecticide. This, even when containing persistent insecticides such as DDT, does not give any lasting protection against insects. The very nature of a true aerosol is such that it produces minute particles that remain airborne for a long time. Hence, it is not designed to leave an adherent film of insecticide on surfaces, nor does it do so. This can usually be done only by a coarse spray, used in such a manner that the surfaces to be treated are wetted by a solution of the insecticide. Evaporation of the solvent then leaves a film of active material having a persistent effect. This can be effected by use of an aerosol-type package, having a lower propellant-concentrate ratio, and designed to give a coarse, wet spray; but such a product is not truly an aerosol; it is simply an automatic pressure pack. Certainly convenient in use, nevertheless its relatively high cost would seem to outweigh this advantage; and as good, or better, results can be obtained by a conventional sprayer, hand operated or air-pressurised by mechanical means. It is also to be remembered that such treatments normally require to be applied only occasionally, whereas space spraying requires frequent repetition. The aerosol insecticide is obviously much more convenient for the latter; but occasional use of conventional spraying equipment for the deposition of persistent films of insecticide is not too troublesome, and is certainly very much cheaper. In any event, partly because it is not a true aerosol, and partly because the writer has little experience with this type of product, it will not be discussed in more detail in this article.

Similar considerations apply to pressure packs designed to deal with cockroaches, silverfish and other insects that nest in cracks and crevices. Pyrethrum has the valuable property of activating such insects, so that they usually emerge from their hiding places, at the same time tending to pick up on their bodies increased dosages of any other toxicants present in the insecticide mixture. True aerosols do not penetrate particularly well into cracks and fissures; but pressure packs providing a coarser spray, that will tend to flood such places, can be used satisfactorily for this purpose. Here again, the conventional and cheaper type of spray gun will normally give at least equally good results.

It is hoped that this short survey of aerosol insecticides and their formulation will prove useful to those interested in the formulation and filling of these useful and convenient appliances.

Automatic wrapping. A four-page illustrated folder from the Forgrove Machinery Co. Ltd. describes their range of automatic wrapping machines for soap, pharmaceuticals, perfumery and cosmetics.

Plastic industrial containers. A catalogue of bins, buckets, tubs, trays and other containers in polythene has been published by Tool Treatments (Chemicals) Ltd.

Prices are included. There is a useful section listing the action of various chemicals on polythene.

Amphoteric Surface Active Agents

By D. Bass, B.SC.*

Amphoteric or ampholytic surface active agents combine anionic and cationic chemical groups and properties. It is possible to make a great many amphoteric compounds, but the most useful are balanced amphoterics which are extremely versatile, showing particular advantages in cosmetics and pharmaceuticals and as metal cleaning detergents.

SURFACE active agents are usually classified according to their dissociation characteristics in water as:

Anionic: in which the hydrocarbon group is part of the negatively charged ion when the compound ionises.

Cationic: in which the hydrocarbon group is part of the positively charged ion when the compound ionises, and

Nonionic: which dissolve without ionisation.

There is however a fourth very large group of surface active agents which can combine within themselves both anionic and cationic chemical groups and properties. These are called *ampholeric*. Theoretically they act more like anionics in the alkaline range and resemble cationics in the acid range, but this is subject to considerable variation depending on their chemical structure. The label "amphoteric" was originally adapted by H. S. Mannheimer from inorganic chemistry. The rather unsuitable term "ampholytic" is also sometimes used, being a contraction of amphoteric electrolyte.

It is strange that potentially the largest group of surface active agents has been so long neglected. The first amphoteric surface active agents postdate the anionics (not counting sulphated oils) by only a few years. Alkyl polyaminoethylglycenates were patented by I. G. Farbenindustrie A.G. in the 1930's but were never produced on a commercial scale. Further patents were taken out in the U.S.A. in 1937[1] and 1938[2] and yet, until 1947 when H. S. Mannheimer applied for patents which were issued in 1950,[3] no serious effort was made to market an amphoteric surfactant.

The compounds mentioned in the Mannheimer patents have been manufactured and marketed by the Miranol Chemical Co. Inc. for 10 years. While other manufacturers have offered amphoterics on a more or less limited scale, most of their amphoteric surfactants are of distinctly different chemical structure and, therefore, their chief applications cover many fields and are not readily interchangeable. Some of these variations will now be discussed in greater detail.

* Cyclo Chemicals Ltd.

Amphoteric variations

A great many compounds fit the description of amphoteric surfactants and their relationship in terms of behaviour is often only coincidental or illusory. They range from products whose principal activity is in the cationic range, such as alkylbetaines, possessing practically no detergent properties and being only partially compatible with anionics; to products like alkylamine glyceride monosulphate, whose principal activity is in the anionic range. The latter is compatible with some cationics but will destroy or severely disturb the phenol coefficient of quaternary germicides.

It is the *balanced* amphoteric that is the most valuable and versatile because its utility range is wider than that of the singularly oriented compound, with its utility limited to one range or the other. While the balanced amphoterics are the most valuable types the potential number of other amphoteric surfactants which could be constructed is truly staggering. Almost any anionic compound can be turned into amphoterics by introducing an amine group into the molecule. These compounds can again be varied by introducing more than one amine group or by changing its position in the molecule. Most cationic compounds can be turned into amphoterics by the introduction of an anionic group or groups in a variety of positions, each such variation resulting in potentially very different compounds.

The isoelectric point

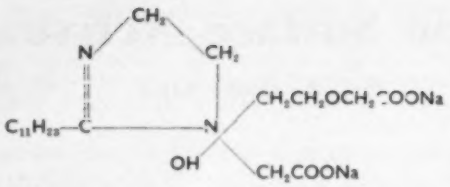
The nature of an amphoteric surfactant, whether balanced, cationically or anionically oriented, is easily recognised even in the absence of any chemical information by determining the area of the *isoelectric point*. For a balanced compound the isoelectric point is, of course, *p*H 7. For a cationically oriented compound it has a higher *p*H value and for an anionically oriented compound a lower *p*H value. Above this *p*H the compound reacts more as an anionic; below more as a cationic, and at the isoelectric point both properties are of equal strength.

To determine the isoelectric point the first step is to determine the *p*H of the compound, which is say 9·5. The sample is heated to 50°C. and hydrochloric acid is added dropwise with agitation. A mental note is made of the speed with which the *p*H is lowered and the point observed at which the acid causes only an insignificant *p*H change. This is the beginning of the isoelectric point area. Addition of the acid is continued until the *p*H drop speeds up again and this is the end point of the area. The isoelectric point is taken as the mid-point of this area.

Properties and applications

It is not possible to ascribe definite characteristics to all amphoterics. While there are some reaction properties common to all, but with varying intensity, no single characteristic can be assumed to be present in one amphoteric because it is present in another. The combination of properties available in a balanced amphoteric can be remarkably wide and this will be illustrated with a description of a single example. The sodium salt of substituted lauroyl cycloimidinium dicarboxylate is marketed under the trade name *Miranol C2M Conc*[4] which will be used for brevity. This compound is a balanced

amphoteric surface active agent and has the structure illustrated on the right. Miranol C2M Conc is non-toxic and non-irritating to human skin and eyes and is an outstanding foaming agent used extensively in the cosmetic and pharmaceutical industries, either replacing or in combination with sulphated fatty alcohols. The latter lack the non-irritating and skin and hair conditioning features which the amphoteric possesses, yet Miranol C2M Conc can even impart these properties to sulphated fatty alcohols in mixtures.



This same compound is used as a replacement or partial replacement for nonionics as it can provide good foaming properties where desirable. In mixtures with quaternary germicides it adds to the phenol coefficient rather than detracting from it. The formulation of compounds containing considerable amounts of alkalies is permitted, while the tolerance of most nonionics is small. Miranol C2M Conc imparts grease and soil lifting properties, while nonionics and most other surfactants function in a distinctly different manner which takes much longer. Last but not least, this amphoteric imparts all such properties to the nonionic in mixtures and keeps the nonionic in solution at or near the boil.

As a partial replacement for cationics, Miranol C2M Conc changes the greasy feel of the cationic on fabric or hair and imparts rinsability, offsetting the gradual waterproofing effect of the cationic fabric softener. Thus a balanced amphoteric surface active agent can wholly or partially replace anionics, nonionics and cationics with innumerable advantages.

Furthermore, Miranol C2M Conc has proven suitable for uses never before possible, such as in the formulation of clear liquid products containing high amounts of alkali and/or electrolytes for heavy duty cleaning, especially heavy duty steam cleaning compounds. With it, compounds containing up to 20% caustic soda can be formulated. It is stable in solutions of alkali electrolytes up to and beyond the saturation limit, such as 10% sodium tripolyphosphate or 50% sodium metasilicate. Such compounds have shown themselves to be of outstanding quality, especially in the steam cleaning field, at costs no higher than conventional powdered products.

They have these advantages: coil clogging is eliminated because of improper solution preparation, corrosion is prevented, aluminium can be steam cleaned, and cleaned metal parts can be painted before they are completely dry. Household products can be prepared almost entirely without the use of expensive potassium salts and entirely without the use of expensive hydrotropes.

The detergent sulphate and sulphonate salts of Miranol C2M Conc as well as other balanced amphoterics of the same series provided shampoo detergents which will not sting or burn the eyes and are, furthermore, completely non-irritating and non-toxic. Further uses of this compound include medicated shampoos containing quaternary germicides which pass the Draize Test; skin cleansing formulations and acne lotions; barrel cleaning of nuts, bolts, screws, etc., before electroplating; and emulsion polymerisation.

Uses to which other amphoterics have been put include Antara's products for acid and alkali wool fulling and washing of carbonised wool without a separate neutralisation bath; resin compatible softeners for textiles which do not yellow on high temperature curing; General Mills' products[5] for cosmetics; and Armour's products, which are used for pigment softening and in emulsion paints to prevent separation or gelling in freeze-thaw cycles. Germicidal properties, which are unaffected or only slightly impaired by the presence of protein and starches, have been claimed by Goldschmidt[6] and Armour with suggested applications in the dairying industry.

In spite of their late start amphoterics are now accepted by the cosmetic, pharmaceutical and metal cleaning industries as essential raw materials. Chemists in other industries are now finding that amphoteric surface active agents are versatile materials.

REFERENCES

1. U.S. Pat. 2,097,864.
2. U.S. Pat. 2,129,264.
3. U.S. Pat. 2,528,378-9-80.
4. Available in U.K. from Cyclo Chemicals Ltd.
5. D. L. Anderson and A. J. Freeman, *J. Soc. Cos. Chemists*, 1957, **8**, 277.
6. R. Neu, MANUFACTURING CHEMIST, 1954, **25**, (1), 10.

Industry's Publications

Polythene-coated film. A handbook outlining the properties of *Polycell* polythene-coated cellulose film has been issued by British Cellophane Ltd. The product is said to offer the advantage of transparent flexible packaging to products not usually presented in such a way.

Methanol. B.S. 506 : 1958, "Methanol" (13 pp., 3 diagrams), one of a series of British Standards for solvents and allied products, supersedes the 1950 edition. The main changes that differentiate this edition from its predecessor are the introduction of specific gravity limits at 25/25°C. for use in tropical climates; the inclusion of a test for miscibility with water; and the replacement of the limit test for aldehydes and ketones in the earlier edition by a method for determining them. The test has been clarified and the presentation brought into line with that of other British Standards for chemicals. The Standard may be obtained from the British Standards Institution, 2 Park Street, London, W.1. Price: 4s. 6d. net.

London Medical Handbook. The bulk of this 168 pp. book consists of a list of medical specialities indexed by brand name in alphabetical order and giving maker or supplier, composition, pack and price, therapeutic indications and dosage. There is also a useful therapeutic index. Like its predecessors, this book is a convenient guide to a large number of branded pharmaceuticals.

Electrified production. This is the title of a new quarterly illustrated four-page newsletter prepared by the Electrical Development Association, and intended for distribution by the Electricity Boards to selected industrial consumers in their areas.

The first issue is prefaced by a message from Lord Chandos, immediate Past President of EDA, and also contains several brief notes on specific applications of electricity to industry, and an account of the electrification of a Stoke-on-Trent pottery.

Copies of the newsletter can be obtained either from Electricity Boards or direct from EDA, London.

Manufacture of Fatty Acids by the Soda Saponification Process

NEW PLANT COMMISSIONED BY PRICE'S (BROMBOROUGH) LTD.

By A. Vickery, M.SC.*

Ricinoleic and 12-hydroxystearic acids, the main fatty acids of castor oil, contain between 60 and 65% free fatty acids when made by the conventional splitting process. In order to obtain products with at least 90% free fatty acids, Price's (Bromborough) Ltd. have recently erected a soda saponification plant. The technique, the plant and the products are described in this article.

THE first stage in the manufacture of fatty acids from neutral oils and fats is the splitting of the glycerides into their component fatty acids and glycerin. This is usually accomplished by subjecting the glycerides to hydrolysis with steam at high pressures. The hydrolysis can be carried out either continuously in specially designed splitting columns or batch-wise in autoclaves; in both cases the plant is made of stainless steel.

These methods are satisfactory for producing fatty acids such as stearic, oleic and other conventional fatty acids of commerce. This is because such acids are not affected in any way under the conditions employed during the splitting process, for the following reasons. In saturated fatty acids, such as stearic acid, the only active group is the terminal carboxyl, which does not undergo any further reaction when detached from the glycerin, while with acids such as oleic acid or linoleic acid, although double bonds are present in addition to the carboxyl group, they also do not react.

On the other hand, certain special fatty acids which are of commercial importance contain a further active group. Two of these acids are ricinoleic and 12-hydroxystearic acid which are, respectively, the main fatty acids present in castor oil and fully hydrogenated castor oil. The structural formulæ of these two acids are:

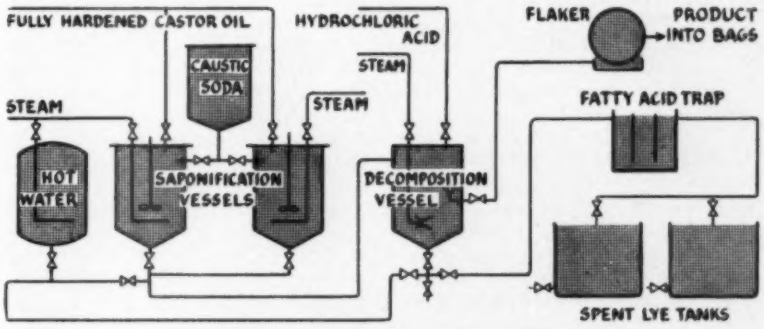
$$CH_3\cdot(CH_2)_5\cdot CH(OH)\cdot CH_2\cdot CH{=}CH(CH_2)_7\cdot COOH$$

Ricinoleic acid

$$CH_3\cdot(CH_2)_5\cdot CH(OH)\cdot(CH_2)_{10}\cdot COOH$$

12-hydroxystearic acid

It will be noticed that although both these acids have the usual terminal carboxylic group they also have a hydroxyl group in the twelfth carbon atom, otherwise the formulæ are identical with oleic acid and stearic acid respectively.



Flowsheet of 12-hydroxystearic acid plant.

Both ricinoleic acid and 12-hydroxystearic acid can be made from the corresponding glyceride oils by the high-pressure splitting process; however, under the temperature conditions of this hydrolysis, *i.e.* approximately 230°C., the presence of both the active hydroxyl group and the active carboxylic group leads to interesterification, with the result that an equilibrium condition is set up so that the final product contains only approximately 60/65% free fatty acid. In order to obtain a product with at least 90% free fatty acid it is necessary to prevent the interesterification taking place. This can be done by blocking one of the active groups during the splitting process.

In order to do this the glyceride oil is heated with the calculated quantity of caustic soda to ensure complete saponification. This splits off the glycerin with the simultaneous formation of the sodium soaps of the component fatty acids present in the oil. The soap formation effectively blocks the carboxylic daci group and thus prevents esterification with the free hydroxyl groups. The sodium soaps are then treated with mineral acid at temperatures which do not give rise to interesterification, and a fatty acid product is obtained with a free fatty acid content of at least 90%.

This soda saponification technique is the basis of a new plant recently completed at the Bromborough Pool factory of Price's (Bromborough) Ltd., for the large-scale manufacture of 12-hydroxystearic acid and ricinoleic acid.

Details of plant

The soda saponification plant was built by the Engineering Department of Price's (Bromborough) Ltd.

Oil is saponified in a mild steel vessel with an open steam coil situated at the bottom of the vessel, and fitted with a slow speed six-bladed agitator. This agitator has another paddle with vertical prongs which acts as a foam breaker. A cold water spray is fitted into the top of the vessel and can be used as an additional foam breaker to prevent the contents boiling over due to the heat produced during saponification. The plant is fitted with two identical saponification

* Price's (Bromborough) Ltd.

vessels connected by a common line to the soap decomposition vessel.

The oil to be split is pumped into the saponification vessel and there mixed with hot water. When 12-hydroxystearic acid is being made the oil/water mixture must be maintained at a temperature above the melting point of hardened castor oil. The oil/water mixture is agitated and caustic soda solution run in until a 10% excess of caustic soda over the theoretical amount for saponification is present. The contents of the vessel, which now consist of the sodium soaps of the fatty acids present in the oil, free glycerin and water, are boiled by means of the steam coil for approximately ½ hr. before discharging to the soap decomposition vessel.

The interesting thing about this vessel is the material of construction used. This is a variety of *Keebush*, a synthetic resin/asbestos material supplied by the Kestner Evaporator and Engineering Co. Ltd. This material is both acid- and alkali-resistant and has the additional advantage of being a poor heat conductor. The vessel is fitted with two low-pressure steam injectors which act both as a source of heat and as agitators.

As the soaps are discharged into the decomposition vessel commercial quality hydrochloric acid solution is simultaneously pumped in until an excess, based on the amount of caustic soda used for saponification, is present. The hydrochloric acid reacts with the sodium soaps to give the free fatty acids and sodium chloride and the whole mixture is boiled for approximately 10 min. to take the reaction to completion. Under these conditions only a very small amount of interesterification takes place.

The "lye" is then run off through a *Keebush* trap, which retains any entrained acid. When making 12-hydroxystearic acid the fatty acid is displaced from the decomposition vessel with hot water on to a twin-roller water-cooled flaker, and the flakes are packed in 56-lb. multi-wall paper sacks. In the case of ricinoleic acid the "lye" is run off first, and the fatty acid can then be run off through another outlet direct into drums.

The decomposition vessel is also fitted with a *Keebush* cold water spray condenser which is vented to atmosphere, to ensure that hydrochloric acid does not escape into the air. The hydrochloric acid is stored in a rubber-lined mild steel tank which is also vented to atmosphere *via* the spray condenser. The storage tank for the 100°Tw caustic soda is made of mild steel and there are also storage tanks for castor oil, hot water and the "lye."

Details of products

The soda saponification plant has been installed to make *Prifac* brand 12 - hydroxystearic acid. This is Price's name for hardened castor oil fatty acid obtained by the saponification of hydrogenated castor oil. The *Prifac* material contains approximately 85% of 12 - hydroxystearic acid, the remainder being predominantly stearic acid.

At present the main commercial use for 12-hydroxystearic acid is in the manufacture of lithium base lubricating greases. It is used either alone or in combination with other fatty acids as the acidic component for combination with lithium hydroxide to produce the lithium soaps which act as the thickening agents for the grease. Lithium greases have only come into commercial use since the middle nineteen-forties, and latest figures from the United States show they comprise approximately 27% of all lubricating greases produced; this percentage of the market is still rising and by 1965 should reach 42%. This rapid advance in the development of lithium greases is primarily due to their versatile performance, which is such that they are now commonly referred to as "multi-purpose" greases, and they are being used in ever-increasing quantities for automotive, aeronautical, farm and industrial use.

In addition to the conventional mineral oil lubricating greases, lithium hydroxystearate has proved the most successful thickening agent for the speciality greases in which the mineral oil is replaced by synthetic lubricants of the aliphatic diester (*e.g.* di-2-ethylhexyl sebacate) and silicone fluid types. These synthetic lubricant greases have found particular application in the aircraft industry where greases are often subject to extremes of temperature.

In addition to lubricating greases 12-hydroxystearic acid is used in the manufacture of alkyd resins which are used for plasticising urea/formaldehyde or melamine/formaldehyde resins for the production of stoving finishes in the surface coating industry. It can also be used in conjunction with epoxy resins to produce plasticising alkyds.

Although primarily designed for the manufacture of 12-hydroxystearic acid, the plant also produces *Prifac* brand ricinoleic acid. This product has a fatty acid content of 93% minimum compared with a figure of 60/65% for the normal split castor oil fatty acids, and meets the B.P. specification (1948) for ricinoleic acid.

Ricinoleic acid is used in a variety of products including pharmaceuticals, cosmetics, stencils, printing inks and ball point inks. There is also considerable use for the esters of ricinoleic acid, particularly the monoglyceride ester. As an example of a potential new use it has been recently stated that improved urethane coatings can be achieved by using glyceryl monoricinoleate or ethylene glycol monoricinoleate in place of castor oil.

In addition to the manufacture of 12 - hydroxystearic acid and ricinoleic acid the soda saponification plant can be adapted to produce another interesting fatty acid —tung oil fatty acids. Although tung oil is used by the surface coating industry because of its exceptionally rapid drying properties, it is these properties which make it difficult to produce satisfactory tung oil fatty acids by conventional methods.

Tung oil contains a high proportion of elæostearic acid which is the fully conjugated isomer of linolenic acid. This conjugated system of double bonds in the elæostearic acid so enhances the drying properties of tung oil fatty acids that under the normal high pressure splitting conditions the elæostearic acid polymerises with subsequent loss in acid value, and splitting by the older Twitchell method gives a product which is very dark in colour. *Prifac* brand tung oil fatty acids, however, can be produced on the soda saponification plant with a free fatty acid content of over 95% and is a product which should be suitable for use in the manufacture of alkyd resins.

Perfumery bulletin. The Gattefossé Company of Lyons has started to publish "La Parfumerie Moderne" as an annual technical bulletin. The first issue contains articles on cosmetic analysis, aromatic chemicals, essential oils, biological products and rheology. The same firm has published a book on the medicinal aspects of French lavender.

The Choice of Heating and Ventilating Systems for Chemical Factories

By J. E. Greatorex, M.I.H.V.E., A.M.INST.F., M.A.S.H.A.E.

The nature of the processes carried out in chemical factories makes stringent demands upon heating and ventilating systems. Here the author, a consulting engineer, describes installations which have proved their value in these conditions. He emphasises the importance of choosing materials that will resist corrosion and of siting ventilation plants in positions which facilitate regular maintenance. Finally he discusses factory insulation, now a statutory requirement for new buildings, and the insulation of pipework and equipment.

THE Factories Act requires heating and ventilating systems in all factories for the comfort and health of the workers. They are also necessary for manufacturing processes to be carried out efficiently, productively, hygienically, safely and economically.

In the chemical factory the type of heating and ventilating systems installed will depend largely upon the processes used and may well include provision for air conditioning and dust and fume extraction.

Air conditioning and insulation

Air conditioning required in, say, a pharmaceutical factory may comprise inlet and exhaust fans, with air filters, heaters, air washer and ranges of ductwork complete with grilles or diffusers. The installations should be designed so that processes can be carried out in as pure an atmosphere as possible which, in certain cases, may require a substantial reduction of the bacterial count of the air.

Different types of systems may be considered for various parts of the factory buildings. For instance, it may be decided merely to heat the administrative offices by means of a low-pressure hot-water system with radiators or other form of heating surface and to limit expensive air conditioning to the laboratory and certain production areas.

Whether refrigeration should be included with the air conditioning system will depend probably more on the temperature and humidity requirements of the air for production or research purposes, rather than on the comfort of workers, although some cooling is invariably required during the summer, if only for a few weeks.

Where full air conditioning is provided, complete with refrigeration, particular attention should be paid to the insulation of the building and the installation of double windows should be considered, together with blinds to reduce solar heat gains. The roof should be particularly well insulated and, if possible, flat concrete roofs should be kept flooded with water, or at least insulated with cork.

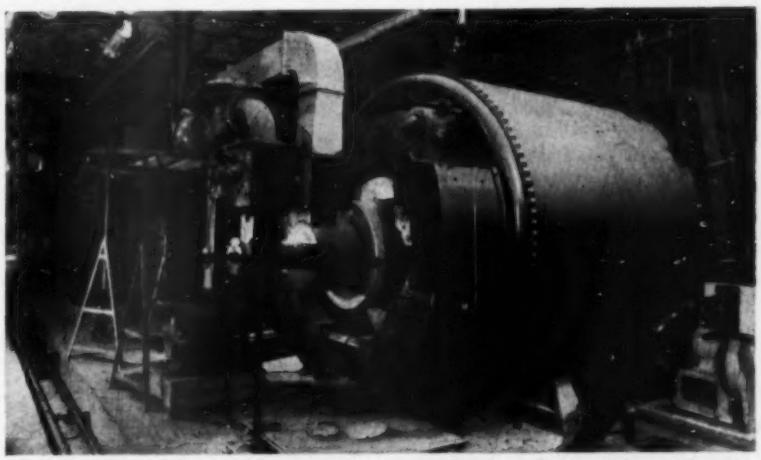


Fig. 1. Highly efficient "Economic" boiler installation with gas firing equipment. These boilers may also be oil-fired or solid fuel-fired with automatic stoker.

All fresh air intake ducts and exhaust discharge ducts should be carefully sited, especially in cases where fumes are exhausted, to ensure that the fresh air entering the air conditioning plants is not contaminated in any way.

The boiler house

Usually a central boiler house will be required to generate steam or high-pressure hot water for heating and process purposes. This should be sited taking into account prevailing winds and the need to keep ventilation fresh air intakes free from contamination. For a large boiler house where solid fuel is to be used, grit arresting plant will be required, regardless of whether solid or oil fuel is used. It is important to build the chimney high enough to reduce sulphur, soot, grit and oil deposits to a minimum. The recommended height for chimneys in large installations is 120 ft., but in all cases the Local Authority should be consulted.

The boiler house is one of the most important buildings in any factory, particularly in a chemical factory where heat is normally required for process purposes in addition to the many other uses for steam or high-pressure hot water.

Generally, boilers most suitable for efficient steam raising are also suitable for high-pressure hot-water generation, and therefore the choice of boiler plant for large installations will most likely depend on the space available and on the method of firing.

Choice of boiler fuel

Oil firing is widely used these days in modern boiler houses because of cost, cleanliness and the

small storage space required, but the final choice of fuel may depend on the location of the factory and perhaps preference for an indigenous product such as a local coal supply, especially if it is cheaper. But it is wise to plan the boiler house so that more than one type of fuel can be used. This can be done even with modern "packaged" boilers, as either oil or gas can often be used and in at least one case they can be converted to solid fuel in an emergency, although the rating of the boiler would be considerably reduced.

Fig. 1 shows a highly efficient "Economic" type boiler installation complete with gas firing equipment. These boilers can also be oil fired and automatic stoker fired with solid fuel. Steam is still commonly generated and distributed in chemical factories for heating and process purposes, low-pressure hot water being provided where required through heat exchangers in calorifier chambers located in the buildings to be heated.

High-pressure hot-water generation

Fuel savings of up to 10% can be made in certain cases by generating and distributing high-pressure hot water; this is due to the fact that in steam systems, unless a high percentage of the condensate is returned, a large and expensive water treatment plant is required for the feed water, together with the cost of heating it.

In addition condense mains, unless copper pipes are used, tend to corrode quickly and therefore need replacing frequently. Flash steam is also a reason for fuel loss and this difficulty cannot be avoided entirely even in the best designed steam system.

Where high-pressure hot water is used, low-pressure steam can be generated if required through heat exchangers or steam generators located near to process plant.

Generally high-pressure or medium-pressure hot-water generation should be considered where the factory premises consist of a large number of low buildings, say one or two storeys high, spread over a considerable area. In such cases capital savings may also be made.

Boiler house instrumentation plays an important part in the safe running of the plant, apart from the value of instruments in helping to maintain high combustion efficiencies, thereby reducing fuel consumption.

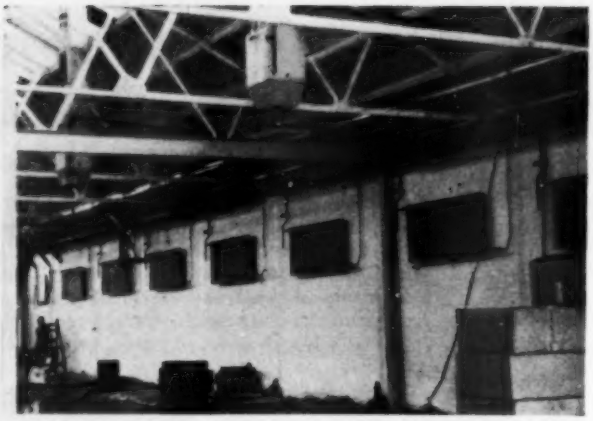


Fig. 2. Typical installation of radiant panels and unit heaters fitted with fresh air inlet ducts fed by low-pressure steam at 30 p.s.i. through a pressure reducing valve.

Fig. 3. Radiant heat ceiling during installation; it comprises pipe coils fed by low-pressure hot water at 180°F. maximum temperature located over acoustic steel tiles.

Where possible, metering of steam and fuel should be arranged and recorded or at least logged; also, because of the Smoke Abatement Act, all boiler houses should be fitted with smoke alarms and recorders.

Heating installations

The type of heating system to be installed in the various factory buildings should be considered separately for each block, as much will depend on the use of the building, its size and construction.

The calorifier chamber, when required, should be located centrally in the block in order to economise on pipe runs, with the feed and expansion tank located at high level above the chamber.

Where unit heaters, convectors or radiant panels are to be used in shops or stores high- or medium-pressure hot water, or steam, could be used direct. A recent heating system which has been used with some success for similar applications is the high level radiant coil installation which depends on efficient insulation reflectors located above the coils to direct the heat downwards.

Some advantages of radiant heating

Generally, radiant systems have been found to be economical in running cost when compared with convection systems, and they are particularly useful in shops to offset fabric losses where high air changes are required due to fume or dust exhaust systems.

Fig. 2 shows a typical installation of radiant panels and unit heaters fitted with fresh air inlet ducts, fed by low-pressure steam at a pressure of 30 p.s.i. through a pressure reducing valve. In this particular case the unit heaters are supplying warm fresh air, although not filtered, to offset air exhausted by the dust extraction systems located in the same shop. The radiant panels have been found useful here in providing personal warmth to the occupants despite the high rate of air change taking place.

Fig. 3 shows a modern radiant ceiling heating installation under construction which consists of pipe coils fed by low-pressure hot water at 180°F. maximum temperature located above acoustic steel tiles. This type of false ceiling installation can be designed to incorporate heating with acoustic treatment, also inset lighting, ventilation and sprinkler installations, without utilising any of the valuable floor space and leaving complete freedom for installation of partitions.

Such a system is particularly suitable for administrative and laboratory blocks, especially where they consist of two or more storeys. When combined with mechanical inlet and extract ventilation the ceiling heating coils need only have enough surface to take care of the fabric heat losses.

Convection systems

An alternative scheme is shown in Fig. 4, here we have a concealed convector system, with all convectors neatly located under the windows, where the heat given off is most effective in counteracting the cold downdraught from the glass. In this particular case the convectors are fed by low-pressure hot-water steam generated in a calorifier chamber below, and the circulation is controlled so that the required internal temperature is maintained regardless of the weather.

A typical calorifier installation complete with thermostatically controlled mixing valve and circulating pumps and headers is shown in Fig. 5. In addition a typical calorifier chamber will probably contain domestic hot-water storage calorifiers and a condense pump and receiver set if steam is being distributed from the boiler house.

Ventilation and air conditioning

Most chemical factories being built today require some form of mechanical ventilation or air conditioning in various parts of the factory buildings; natural ventilation is normally not sufficient. Mechanical ventilation may be required in the administrative buildings and it will almost certainly be necessary in the laboratory block and in some of the production shops.

Whereas ventilation is necessary to provide an odourless atmosphere together with comfortable temperature conditions, air conditioning is usually essential if control is required of the moisture content in the air, *i.e.* relative humidity.

In order to simultaneously control rate of ventilation, temperature and humidity all the year round, some method of cooling is required and normally refrigeration is used. Without refrigeration, comfort conditions could only be maintained for approximately 90% of the year.

It may be thought that because of the considerable expense and space required for refrigeration plant, the discomfort experienced by the occupants during heat wave conditions should be tolerated, this would not apply, however, if exacting conditions were necessary for production purposes, and in this case full air conditioning may well become essential.

For economic reasons, and because some process shops may require different air conditions to other parts of the factory, a number of small air conditioning systems may be preferred instead of a large central system.

Ventilation plant rooms must be of sufficient size and height to enable proper maintenance to be carried out; only too frequently these expensive and important plants are crowded into a corner of the factory where they are forgotten and neglected.

Air conditioning plants will give many years of efficient service if regularly maintained. It is imperative, for instance, to clean the air washer and filters often and to keep the controls in perfect order if high efficiencies are to be maintained.

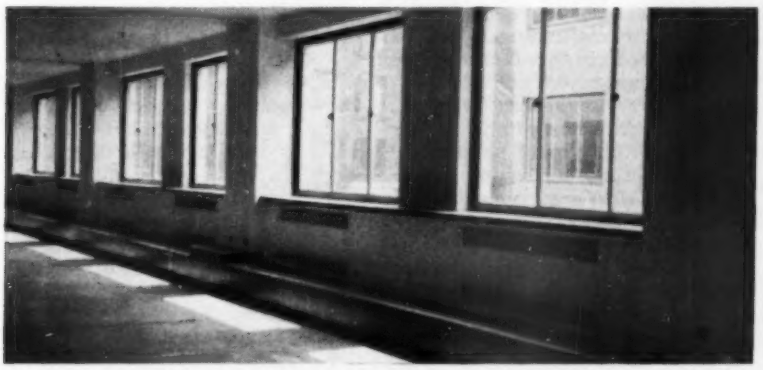


Fig. 4. An alternative scheme to that shown in Fig. 3. Here there is a concealed convector system with all convectors neatly placed under the windows where they are most effective in counteracting draughts.

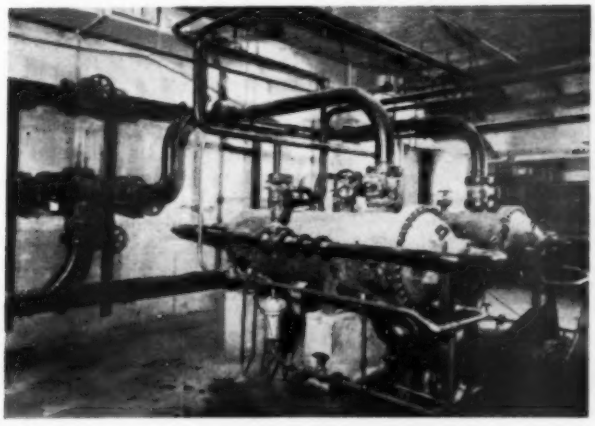


Fig. 5. Typical calorifier installation complete with thermostatically controlled mixing valve and circulating pumps and headers.

Fume and dust extraction

The type of systems which come under the above heading are many, but the fundamental basis of them all is the control of the unwanted fumes or dust. In order to remove them from the area in which any operator may have to work some knowledge of particle size, density, velocity of escape, limit of concentration and quantity of unwanted dust, fume or vapour produced is required to form a basis for design.

Large volumes of air are normally required with these systems, so that the velocity of the air is sufficient to control the travel of the contaminate. It follows that if the area of generation or the area through which the contaminates escape is kept small, the air volume can be reduced or used more effectively.

Generally a specially shaped hood or slotted duct is required to contain the contaminate and therefore, because of their expense and the amount of air required, it is economical to ensure that the hoods are kept to a minimum size compatible with reasonable efficiency.

In this respect it is important to realise that the exhausted air must be replaced either by natural or preferably by mechanical means and that if the unavoidable ingress of air is used to give general ventilation it is normally required to warm the air in order to eliminate cold draughts.

Fig. 6 shows a fume exhaust system installed in connection with plating tanks. Here, because of the size of the tanks (24 ft. long by 4 ft. wide), separate fume exhaust systems in PVC ducting have been provided at each end of the tank, so that each system copes with a 12 ft. length on either side of the tank.

Assuming an average control velocity of say 200 ft. per min., such a tank would require: $24 \times 4 \times 200 = 19{,}200$ c.f.m. or say 10,000 c.f.m. of air for each plant. This involved 27 in. or 30 in. centrifugal fans, all PVC lined. The fresh air inlet unit heaters noticed in the picture replaced the exhausted air with warm fresh air. Note also the steam-fed radiant panels for warming the occupants, which are thermostatically controlled to prevent overheating of the shop.

Hoods over tanks and vessels cannot be used when cranes are installed to traverse the length of the shop; in such cases slotted ducts at the side of the tanks must be used.

In the canteen block, the kitchen ventilation will need particular attention in order to remove all fumes and cooking odours from the source and thus prevent these permeating the cafeteria and dining rooms. Vertical glazed screens mounted above the cooking apparatus to within 6½ ft. of the floor have proved successful in kitchen ventilation schemes, with exhaust ducts fitted with grilles passing through the glazed screens. Alternatively each hood can be fitted with one or more roof-mounted extract fans exhausting the fumes direct to atmosphere.

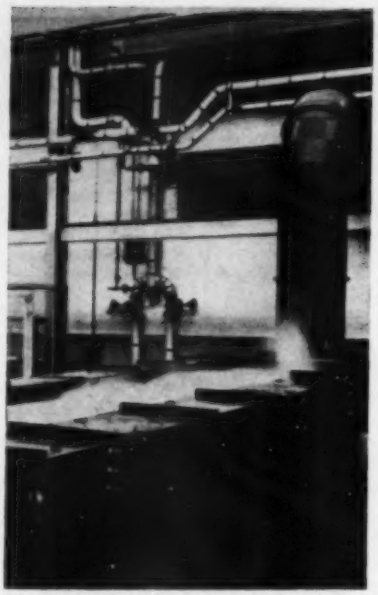


Fig. 6. Fume exhaust system for plating tank. Separate PVC exhaust systems have been provided at each end of the tank.

In order to replace the air exhausted from the kitchen ample warm fresh air should be supplied to the cafeteria and dining rooms and with this arrangement there is no likelihood of kitchen odours getting into these areas.

Materials for pipes and ducts

A great variety of material is available for use with engineering services and usually the chief engineer in a chemical factory has very decided views on the subject, especially when they are based on actual experiences.

The cheapest material for a pipe or duct, for instance, may well prove the most expensive in the long run, this is particularly the case if production is held up every few years while the corroded equipment is being replaced. Good ventilation in a production shop will, of course, tend to reduce the corrosive fumes in the atmosphere and thus enable normal and cheaper materials to be used.

Heavy quality steel pipes suitable for the working pressure are normally used for heating gas and steam pipework; with galvanised steel for cold and hot water supplies, compressed air and condense services.

Copper is often preferred for some of these latter services and recently PVC pipes have become popular for cold water and certain chemical services where the liquid is below 150°F. Stainless steel may have to be used for pipes and equipment where particularly corrosive conditions exist and, as shown in Fig. 6, PVC ducting welded by the hot-air process can be most suitable for fume exhaust systems in such an atmosphere. Usually galvanised steel sheets are chosen for ductwork for normal installations, although extensive use is now being made of aluminium, asbestos cement and fibre glass.

The life of all steel pipes, ducts and equipment, even if galvanised, can be considerably prolonged by painting with acid-resisting paint.

Insulation

All new factory buildings have to comply with the standards of insulation laid down in the recent Factories Act. These have been specified to reduce the waste of fuel for heating purposes and in all cases the additional capital cost involved will be repaid within a few years by savings in fuel.

With reduced heat loss there will be a reduction in size of heating and air conditioning plants, as good building insulation also helps considerably in keeping the building cool during hot weather.

Where full air conditioning is required these spaces should be specially insulated with cork or similar material and glazing should either be eliminated altogether or double glazing used.

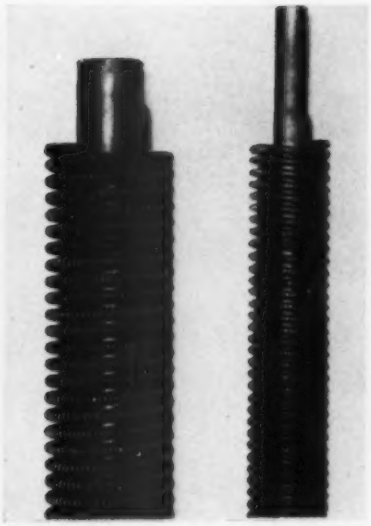
Insulation materials should be carefully chosen and fixed so that the fire hazard is not increased in any way. Existing materials can be specially treated to reduce this hazard. Where necessary, fire dampers should be provided in the ventilating systems set so that the dampers close at 150°F.

All hot pipes should be insulated with plastic or sectional covering to the recommended thickness, care being taken to insulate neatly all flanges.

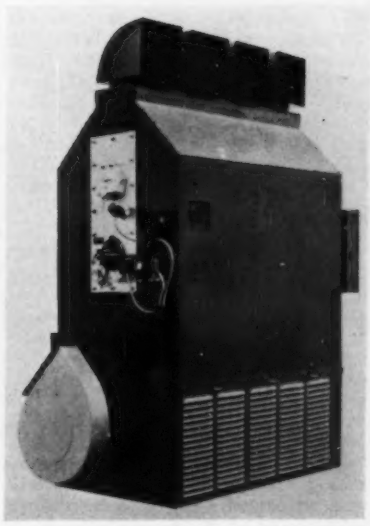
Calorifiers, heat exchangers, condense tanks and receivers, together with boilers, should all be thoroughly insulated with plastic and finished with a hard setting coating.

Painting of pipes and equipment should be carried out to suit each service in accordance with the British Standard recommendations.

"Telcomatic" hot-water boiler for solid fuel.



"Clayton-Still" wire-wound heat exchanger tubes.



Dravo "Counterflo" self-contained space heater.

Heating and Ventilating Plant and Insulating Materials

HEATING

Automatic boilers. *Telcomatic* boilers for hot-water and low-pressure steam heating are built to British standard specification by The Telegraph Construction and Maintenance Co. Ltd. under a licence agreement with the Dutch firm of Moring and Steenaart.

The present range is from 500,000 B.Th.U./hr. to 10 million B.Th.U./hr., fired by solid fuel or oil, fully automatic and with a stated efficiency of 85%. When fired by solid fuel, the system of fuel feed is claimed to ensure an even depth of fire under all load conditions, and this, coupled with the quick reaction of the fire to pressure or thermostat control, is said to enable the boiler to deal economically with all demands. According to the manufacturers ash removal need be undertaken only once every 12 hr. and is a simple, quick and dirt-free operation requiring no tools.

The boilers may be used in smokeless zones, as defined by the Clean Air Act, since they are capable of burning all fuels without smoke.

Air heaters. A range of *Ottazelle* oil fired air heaters with output rates from 83,000 to 1,200,000 B.Th.U./hr. are manufactured by John Colinsons Ltd. Depending on individual requirements these units can be supplied either free standing or with duct outlet connections. It is stated that a completely automatic time and temperature duty cycle is obtainable from all heaters which are also fully protected against overload.

A feature of the heater is the aerofoil shape of the combustion chamber said to give advantages in heat transfer and air flow characteristics. A large convection area consisting of staggered rows of tubes situated directly above the combustion chamber ensures that the circulating air absorbs the maximum amount of heat before the combustion gases reach the fluc. Mounted in the filter chamber at the base of the unit is a propeller type fan. If required this fan may be used for air circulating during warm weather.

Space heater. The Dravo *Counterflo* space heater available from Weatherfoil Heating Systems Ltd. is a self-contained heating installation which transfers heat produced by burning atomised oil on gas in a sealed combustion chamber to air passed over the combustion chamber and discharged into the working area. The heater consists of a stainless steel combustion chamber in which the flame is contained, with a flue-way and economiser tubes arranged below it so that all products of combustion are kept within a sealed circuit and discharged through a centrifugal fan to atmosphere *via* a steel exhaust stack. Air to be heated is drawn into the base of the heater by other centrifugal fans working on the same shaft as the exhaust fan and is passed over the economiser tubes and over the combustion chamber, between it and the outer casing, and is then discharged through adjustable nozzles into the working space.

The air drawn into the heater can either be recirculated from the working area or can be fresh air from outside the factory space. The heaters can be moved to alternate positions and ducting can be incorporated on the discharge side to deliver heat to individual rooms if required. Fully automatic controls are provided to ensure that heat is only provided when required and no fuel is burned when internal temperature requirements are reached.

Heat-transfer. The Clayton-Still heat transfer tube manufactured by the Clayton Dewandre Co. Ltd. has an extended surface consisting of a continuous wire wound into elongated loops which are each bonded to the basic tube in a helical formation.

Surface ratios, loop width and height, gauge of winding wire and density of winding can be varied to facilitate the provision of tubes for any specified purpose. The tubes can be supplied in up to 25 ft. lengths, with basic tube diameters of from $\frac{1}{4}$ in. to 3 in. and over-wire diameters of $\frac{3}{4}$ in. to $4\frac{1}{2}$ in. The materials may be copper, copper alloys, brass, mild steel, stainless steel, *etc.*, and if the basic tube is of annealed copper or copper alloy, the finished product can be bent to any desired shape.

Two special types of tube have

been developed, with the surface extended also within the bore, for special applications where the poor heat transfer properties of the fluid cause a high resistance to heat flow. One of these has an insert of normal wire loops which, if required, can be soldered to the tube, whilst the other has three small diameter plain tubes inserted and soldered in the bore.

Panel radiators. The light-weight, thin panel radiators made by Gulf Radiators Ltd. can be mounted in practically any position on the wall. According to the makers they can be wall mounted on even quite light partitions and when the opportunity presents itself they can be installed as part of a dividing wall to heat two rooms or spaces at the same time.

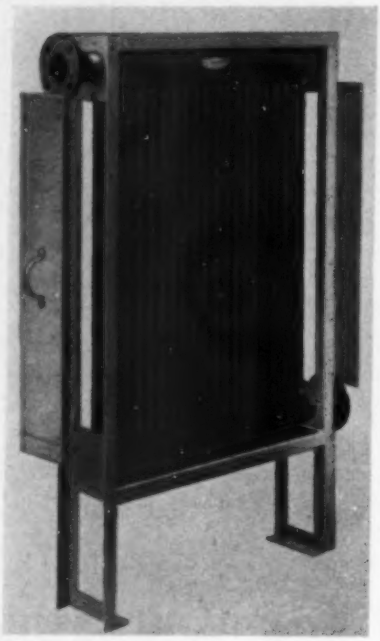
When mounted vertically a considerable amount of heating surface can be installed in wall lengths as short as 12 to 30 in. Installed vertically between machines or wall fixtures the radiant heat is not obstructed but emitted into the open areas where it is most likely to be of benefit. The radiators can be mounted side by side if necessary so that as much as 90 sq. ft. or more of heating surface can be accommodated in 5 ft. of wall length while still retaining the benefit of the higher proportion of radiation emitted by a thin panel.

Heater battery. The *Component Series* air heater battery, made by the Spiral Tube and Components Co. Ltd., uses *Spiral* tube heat transmission tubing and is available in a wide range of sizes. The company have also introduced a new heater, the *Hyduty* unit, which is said to have a greater range of performance in speed, air quantity and temperature rise on L.P.H.W., H.P.H.W. or steam.

The heaters are suspended either from the walls or the ceiling, and three different heating blocks and two motor speeds provide a choice of air quantity and temperature conditions according to requirements.

Micatherm domestic and industrial heating panels are manufactured by the Mycalex Co. from mica and glass bonded under heat and pressure and incorporate a nickel chrome element designed to run at black heat. The element is completely surrounded by *Micatherm*, an insulation material of $\frac{1}{8}$ in. thickness, and therefore takes up little space.

The maximum loading that can be obtained is 750W from a surface area of 18 in. × 14 in., giving a maximum output of 4W p.s.i. of area. The surface temperature at this load is approximately 150°C. in free air. It is stated that since the panels take up a minimum of space, they can be used as desiccators or heaters in all categories of electronic, electrical and mechanical equipment.



" Component " series air heater battery.

Filters. Self-cleaning filters supplied by Auto-Klean Strainers Ltd. for use with oil-fired heating and ventilating systems are of all-metal plate-type construction. They operate on the edge filtration principle and are cleaned without interrupting the flow of liquid by one complete turn of the element spindle, which is either operated manually by a handle or is motor-driven for fully automatic cleaning. This action rotates the element assembly against cleaner blades, which remove all the solids accumulated around the element and deposit them into the filter sump.

In addition to the defined mesh protection given by the self-cleaning element, which is available in filtering meshes down to 0·001 inch, the filters incorporate magnetic units to give added protection against ferrous particles present in the system. Filters are supplied for working pressures up to 1,000 p.s.i. and for flows up to 50,000 lb./hr. of all grades of fuel oil.

VENTILATION

Viscous filters. Air Control Installations Ltd. manufacture a complete range of air treatment equipment, including fans, dust control and air filters. The *Multi-Duty* filter available from them is of the viscous type and is designed for heavy dust loads where constant air volume is important. It is fully automatic in operation and is stated to require attention only every few months.

In operation, closely overlapping panels suspended from attachments on two rotating endless chains form a continuous filter curtain in the airstream. As the panels in turn reach the bottom of the filter they are automatically separated, and pass through a reservoir containing filter fluid in which they hang vertically, allowing the dirt to settle as sludge in the bottom of the reservoir. A timer mechanism allows draining of the panels after they leave the oil reservoir and before they enter the airstream.

Two types of panel are available. These are the Type MS, constructed of folded and crimped galvanised wire mesh, the upper portion being bakelite-fibre coated. Clamped to the free edge of the mesh is an armoured section, which is the only exposed part of the panel on the face of the filter curtain. The overlap provides a depth of four panels in the curtain.

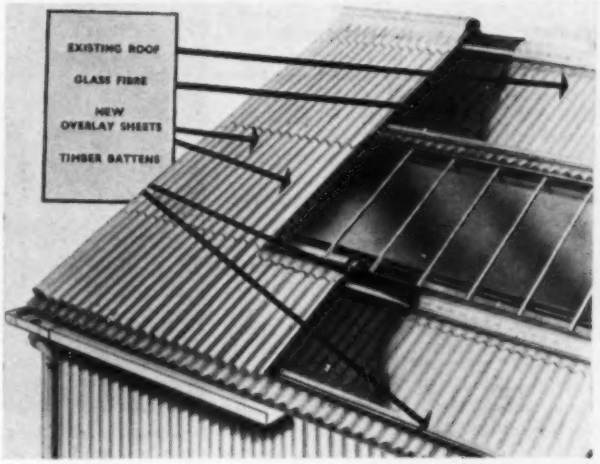
The other, Type DD, is die-stamped from sheet metal, with louvres turned at an angle of approximately 45°. The overlap of the panels is said to compel four distinct deflections of the air in passing through each curtain. This type is recommended for heavy dust concentrations. Efficiency and resistance approximate those of type MS.

Average operating resistance with MS panels is said to be 0·40 in. W.G. and with DD panels 0·45 in. W.G.

Maintenance is normally confined to the periodical removal of sludge when this has reached a depth of 2 to 3 in. in the reservoir.

Dust collectors. Acme Ventilating Ltd. manufacture two pieces of equipment for the process control of fine chemical powders. The first of these is a wet dust collector, the *Air Tumbler*, in which dust or fume is driven by centrifugal action into a constantly re-circulating water film, where the particles are trapped, to be deposited finally in the form of a sludge which can be removed either mechanically, hydraulically, or by hand. Standard units are available to handle any quantity of air up to 36,000 cu. ft. p.m. It is claimed that an efficiency of collection of 99·9% is achieved on particles of the order of 20 microns in size, and smaller units are capable of handling quantities of dust and sludge of the order of 2 tons/hr. The *Air Tumbler* may be used to collect dust in a wet state, or other types will collect coarser dust dry and very fine dust wet.

For collection of material in an entirely dry state the company markets a new range of high efficiency cyclones. According to the manufacturers in the case of hydrate of alumina dust of the order of 20 microns particle size, collecting efficiency has been found to be of the order of 95%. On smaller diameter cyclones of this design efficiencies increased to 99%. The same design is used either for unit or multi-cyclone installations.



Left: "Refrasil" silica fibre thermal and electrical insulant. *Right:* The overlay system developed by the Universal Asbestos Co. Ltd. for the insulation of existing buildings.

Roof extractors. Greenwood's and Airvac Ventilating Co. Ltd. design and manufacture a range of powered and natural ventilators, fan assemblies and ventilating equipment. Their products include *Power Dome* roof mounting extractors, suitable for either flat or sloping roofs, in which the fan housing and weather dome are constructed entirely in aluminium to give good corrosion resistance. The extractors are fitted with a capacitor start-and-run motor which can be fitted with a speed regulator, and are available in a range of sizes and speeds suitable for most applications.

Other extractors include the *Lowline*, available with or without a built-in fan; the *Mechavent Roofline* powered ventilator with a capacity range of from 300 c.f.m. to 19,500 c.f.m.; dome ventilators, continuous rooflight and louvred inlet ventilators. Wall-mounted fan units are also available from the company.

Air conditioning plant for the streptomycin department of the Glaxo Laboratories Ltd. was supplied by the Visco Engineering Co. Ltd. and is so designed that a large proportion of re-circulated air can be used, thereby cutting down the refrigeration load to a minimum. The fresh air is first passed through a brine cooler which removes excess moisture and is then mixed with the correct proportion of re-circulated air. The air mixture is next heated by a steam operated heater battery before being cleaned by a series of *Visco* standard and duplex filters. The air is then delivered to the departments through overhead ducts.

Air operated automatic controls maintain the required conditions, the brine cooler being controlled by a three-way mixing valve which is operated by a humidistat, the room temperature being held by a thermostat which controls the steam supply valve to the heater battery.

Space conditioners. Two types of air space conditioners are available from F. H. Biddle Ltd., one for floor mounting having a vertically upward air discharge and the other for ceiling mounting having a horizontal discharge. The units are designed to accommodate either direct expansion, water, brine or steam coils and are said to lend themselves to any type of installation.

All models are of the draw through type, the entering air passing first through the filter and then through the cooling and heating coils. The heating coil is located after the direct expansion coil to avoid the heating of the latter in winter. If chilled water is used for cooling, the heating coil is placed directly after the filters to prevent the cooling coil from freezing during cold weather. Under certain conditions one water coil may be used for both heating and cooling duties. Units are usually provided with outlets arranged for duct work connections, but can be provided with grilled outlets for free delivery of air into large spaces.

Heating without air movement is sometimes a necessity in the chemical industry, and the company also manufacture a radiant panel. The panels can be sited horizontally or vertically and stand off the walls or ceilings. Three types are available—*Type A:* exposed coil; *Type B:* covered in coil where less back radiation is required; and *B*1 similar to *B* with the addition of internal insulation between coil and back plate, this reduces heat transmission from the back to a minimum.

All units are subject to a 500 p.s.i. air pressure test under water and are available for use with low-pressure or high-pressure hot water or steam.

Control system. An electronic control system for air conditioning and heating plants which uses wire-wound resistances as the sensing elements is available from Teddington Industrial Equipment Ltd. Known as the *Transmatic*, it uses printed circuits and a transistorised amplifier.

In addition to simple proportional control of one motor or damper, either with or without compensation, the control panel can be provided for the control of two motors operated in unison, two motors operated sequentially, three motors operated in unison or three motors operated sequentially. In all these arrangements the control exercised may be on/off or proportional as required, and an adjustable "dead zone" can be provided between stages.

Compensation from either one or two compensating elements each having up to 100% authority can be introduced and a compensating system for central heating applications in which the outdoor element has up to 200% authority is now also available in the standard range.

INSULATION

Silica fibre. *Refrasil* is a silica fibre claimed to have outstanding properties at high temperatures. It is available from the British Refrasil Co. Ltd. in the form of bulk fibre or as batt, cloth, tape, sleeving, yarn and cordage: the material is white and in its bulk fibre and batt forms it looks like cotton. The woven materials are flexible and resemble glass textiles and are used chiefly for high-temperature electrical insulation, while the batt is primarily a thermal insulant.

According to the manufacturers *Refrasil* does not melt or vaporise until temperatures exceeding 3,000°F. are reached. Although at continuous temperatures over 1,800°F. the vitreous silica changes to several crystalline forms and the material thus tends to stiffen, there is no change in physical form or insulating properties. Resistance to thermal shock is good and chemical properties are similar to those of fused silica.

Magnesium compounds. The Chemical and Insulating Co. Ltd. processes dolomite limestone to produce various magnesium compounds, principally the carbonate, oxide and hydroxide, in forms suitable for both pharmaceutical and industrial purposes. Their 85% magnesia is normally supplied in the form of moulded pipe sections and slabs in a wide range of sizes and thicknesses and is said to be suitable for direct application to surfaces up to 650°F.

For higher temperature applications the company manufacture *Metadextramite* (650°F.-1,625°F.) and *Dextramite* (up to 2,000°F.), which are made in the same forms and the same range of sizes. All three materials are also supplied in plastic form for applications where the pre-formed sections and slabs do not fit, while *Dextramite* is also made into insulating bricks which form an efficient insulation backing to firebricks and also have certain load-bearing capacities by themselves.

A recent addition to the company's range has been provided by the development of *Paratemp*, a calcium silicate insulating material claimed to be suitable for application over a very wide range of temperatures.

Asbestos. Insulated asbestos cement cladding systems have been designed by the Universal Asbestos Manufacturing Co. Ltd. to meet modern requirements. Their "sandwich" constructions comprise glass fibre insulation between outer asbestos cement sheets and an asbestos cement inner lining, and are available in a number of cross-sections for fully-pitched roofs and side-cladding. The troughing sandwich is a special type that enables a fully-insulated roof to be laid at a pitch as low as 4°. Sandwich constructions are laid entirely over the roof purlins. For flat roofs, there are asbestos cement decking systems.

Where a high degree of fire resistance is needed, *Ubesto* fire-retardant asbestos insulation board is said to be suitable as an underlining in sandwich constructions, for fixing below battened decking, or as a suspended insulating lining in existing buildings.

For existing buildings there is a new "external sandwich" or overlay system. This provides for the addition of glass fibre insulation and a new outer asbestos cement skin over existing sheeted roofs.

According to the manufacturers, in all the constructions described thermal transmission figures better than 0·2 are obtained.

Asbestos plus silica. *Asbestolux*, manufactured by Cape Building Products Ltd., consists mainly of amosite asbestos fibres and a selected grade of silica, both of which are inorganic and chemically inert. The product is

Selection of thicknesses, diameters and coverings available in "*Rocksil*" rigid pipe sections.

formed by a chemical bond which takes place in an autoclave and is claimed not to suffer from brittleness and alkalinity. According to the manufacturers this process together with the inorganic nature of the ingredients provides the product with a combination of properties, including incombustibility, durability, good thermal insulation value, high chemical and acid resistance, high strength/weight ratio and stability under a wide variety of conditions.

The board is used as a constructional material for the lining of roofs in factories, chemical plant, etc., and as wall and ceiling linings. It is stated that an "Asbestolux lining specification" fully complies with the requirements of the Thermal Insulation (Industrial Buildings) Act 1957, giving a high standard of insulation and fire protection.

Roof lining. *Seel* incombustible roof linings for thermal insulation are available from Chancery Insulations Ltd. The linings consist of prepared grades of asbestos fibre and are applied by a spray medium through specially constructed apparatus. It is stated that the coating can be of any thickness, but that the most economic thickness lies between ¼ in. and 1 in.; the weight of an application is between 5 and 8 lb. per sq. yd., depending upon thickness. Thermal conductivity of the lining is said to be 0·32 B.Th.U./hr./sq. ft./in./°F.

Sprayed asbestos. Another sprayed asbestos product, *Silbestos*, is manufactured by Sprayed Insulations Ltd. The product can be applied to most types of surfaces in thicknesses ranging from ¾ in. to 6 in. and is said to eliminate cold interior surfaces and so prevent condensation. The product is stated to be completely incombustible and also to possess sound absorptive properties.

Pipe insulation. *Rocksil* rigid pipe sections are made by the Cape Asbestos Co. Ltd. and are the latest addition to their range of rock wool insulation materials. They are designed to provide inexpensive pipeline insulation for domestic, industrial and marine requirement in the lower and medium temperature ranges up to 600°F.

The pipe sections are 3 ft. long and have a uniform density of 10 lb. per cu. ft. They are available in thicknesses ranging from ½ in. to 2 in. at ½ in. intervals, both canvas wrapped with and without bands and scrim cloth wrapped with and without bands.

Insulant range. Structural insulation products covering all aspects of thermal and sound insulation are available from William Kenyon and Sons Ltd. They include *Rocksil* mineral wool, quilts and mats, vermiculite aggregates, *Isolatt* corkboard and *Isolite* polystyrene slabs. The company also manufacture ventilation, fume and flue ducting, mine ventilation ducting and fabricated pipework.

ANALYTICAL CHEMISTRY

(*Concluded from page 126*)

20. MANUFACTURING CHEMIST, 1956, **27**, 229.
21. T. Sakaguchi and K. Taguchi, *ibid.*, 787.
22. S. Erbe, *Z. anal. Chem.*, 1958, **159**, 327.
23. G. Lambertsen and O. R. Braekkan, *Acta Chem. Scand.*, 1958, **12**, 360.
24. K. Schilling and H. Dann, *ibid.*, 347.
25. *Idem*, *ibid.*, 348.
26. M. Pohm, *Mikrochim. Acta*, 1958, 120.
27. G. Sandri, *ibid.*, 248.
28. B. P. Korzun, A. F. St. André and P. R. Ulshafer, *J. Amer. Pharm. Assoc., Sci. Ed.*, 1957, **46**, 720.
29. M. Kranjčevič and V. Broz-Kajganović, *Croat. Chem. Acta*, 1958, **30**, 47.
30. D. E. Leavitt and J. Austian, *Drug Standards*, 1958, **26**, 33.
31. M. Kranjčevič, *Croat. Chem. Acta*, 1958, **30**, 53.
32. V. Velich, *Chem. Listy*, 1958, **52**, 346.
33. M. Masse, *Pharm. Acta Helv.*, 1958, **33**, 80.
34. B. Salvesen, *Medd. Norsk. Farm. Selsk.*, 1958, **20**, 21.
35. British Standards Institution, *B.S.* 684: 1958, 100.
36. D. F. Kuemmel, *J. Amer. Oil Chem. Soc.*, 1958, **35**, 41.

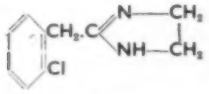
European chemical engineering. The Annual Report for 1957 of the European Federation of Chemical Engineering is now available from DECHEMA, Rheingau-Alle 25, Frankfurt (Main), Germany. The report deals with the work of the Federation, reports from member societies, and also provides a survey of the research institutes in Europe which are concerned with the field of chemical and process engineering and chemical technology.

THERAPEUTICS

By S. J. Hopkins, F.P.S.

Hypertension • Angina • Anticoagulants • Contrast agents
Uræmia • Ferrous sulphate • Anti-emetics • Trichomoniasis
Tetrahydroaminacrin • Cytostatics • Leprosy

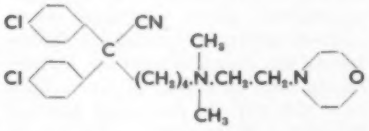
ALTHOUGH great advances have been made in recent years in the treatment of hypertension, the ideal compound that is consistently effective, orally active, well tolerated and selective in action still awaits discovery. Rochelle and Ford[1] have examined a number of imidazoline derivatives for possible use in hypertension, with particular reference to 2-(*o*-chlorobenzyl)-imidazoline or S-9-390. Compounds



of this type are of considerable potential interest, as although imidazoline derivatives such as tolazoline have been employed as peripheral vasodilators, they have not hitherto been found effective in the treatment of hypertension.

In a trial in a short series of 10 patients, using some of these new derivatives, some interesting results were obtained. Some compounds, such as the chlorobenzyl derivative mentioned above, had definite activity, but variations in response were noted. These variations occurred with respect to dose, time of onset and duration of response, and were difficult to explain, as they appeared to be independent of the weight of the patient and the degree of hypertension. The effects can be reversed by noradrenaline, which may give a clue to the mode of action of the drug. Some patients experienced drowsiness during treatment, indicating that the drug has some central activity. Extended therapy resulted in a progressive loss of response to the drug, in spite of increased doses, but this was a transient phenomenon, as sensitivity was regained after a brief rest period. Although this compound has little clinical value, it is of considerable interest as representing a fresh chemical approach to the therapeutic problems of hypertension, and may initiate new lines of chemotherapeutic research.

Further work on ganglion-blocking agents in the treatment of hypertension has been reported by Locket,[2] using a compound with the following structure, and referred to by the laboratory number 189c56. This substance was



highly effective by mouth, consistent in action, and had a prolonged duration of effect. Constipation, which so frequently accompanies use of this type of drug, was noticeably absent. This more selective action suggests that a separation of the hypotensive and gastro-intestinal actions has been achieved. The drug was effective in single daily doses, and the chief disadvantage disclosed by the investigations was that the dose was critical, and slight variations from a determined optimum could produce wide changes in blood pressure.

Angina

Valuable as the nitrites are in the treatment of angina, they have many disadvantages, but recently Master[3] has reported on the successful use of an entirely different compound—iproniazid. This substance, N-isonicotinyl - N′ - isopropylhydrazine, is a powerful tuberculostatic,

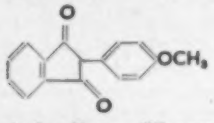
but it also has some central effects, and can produce mild euphoria. The value of iproniazid in angina was recognised by a chance observation of Cesarman,[4] who used it for its psychic effects in the treatment of some depressed cardiac patients. He noted that their angina was improved, but later workers were less impressed by the results obtained.

Following these conflicting reports, Master[3] gave the drug in doses of 90 mg. to a series of 94 patients. Pyridoxine was given at the same time to reduce the risk of peripheral neuritis, which is a known side effect of iproniazid and associated drugs. Almost complete relief of anginal pain was experienced by most patients but this was not accompanied by any changes in the electrocardiograph reading. The underlying disease was therefore unaltered, and this fact invites speculation on the mode of action of the drug. Possible actions include cerebral stimulation, increase in the pain threshold, change of mood, or a direct action on the autonomic system. The side effects of the drug are not without danger. Dizziness and gastric disturbance may occur, but the central stimulation, leading to increased physical activity, may result indirectly in cardiac insufficiency. Similar results to those obtained by Master have been reported by Towers[5] and Wood, who consider that the action of the drug is largely due to that of suppressing pain. These workers suggest that iproniazid is not suitable for the mild hypertensive, as it may encourage too much physical activity, but it may be of considerable value in severe hypertension during a prolonged ischæmic episode.

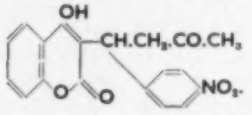
Anticoagulants

Many attempts have been made to discover orally effective drugs intermediate in action between the long-acting dicoumarol and the quick-acting ethyl biscoumacetate.

Warfarin was mentioned in an earlier report (MANUFACTURING CHEMIST, June 1958), and Toohey[6] now regards that compound as ranking with phenindione as one of the best anticoagulants for short-term therapy. Favourable comments have also been made by Baer,[7] who considers it easy to use, and permitting smooth control with small doses. Anisindone or 2-



anisyl - indandione (MANUFACTURING CHEMIST, October 1958), another interesting anticoagulant, has now been evaluated clinically by Kellaway.[8] From his work, anisindone, also known as *Miradon*, appears to have certain advantages over phenindione, particularly in the predictability of the initial response and the consistent effects of maintenance doses. The drug approaches more closely to the ideal requirements of both short and long-term anticoagulant therapy. Other clinical reports on this group of drugs include that of Rullo[9] *et al.* on acenocoumarol, [3-(β-acetonyl-*p* - nitrobenzyl) - 4 - hydroxycoumarin], or nicoumalone. This



compound is rapidly excreted, apparently in an unchanged form, and in this respect it differs sharply from ethyl biscoumacetate, which is excreted as an inactive metabolite. Average maintenance doses were some 6·5 mg. daily, and side effects were few. These low doses increase the smoothness of control, and the rapid but not too prolonged action of the drug makes it suitable for the treatment of ambulant patients.

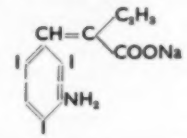
Contrast agents

Simultaneous choleocystography and urography has sufficient advantages to make the method attractive, either as a time-saving device in routine work or for confirming diagnosis when involvement of both biliary and renal systems is suspected. Such a method has been described by Orloff,[10] using as the contrast agent a mixture of methylglucamine, 3 : 5 - diacetylamino - 2.4.6. - triiodobenzoic acid and N - N′ - adipyl*bis* - 3 - amino - 2.4.6.-triiodobenzoic acid. After intravenous injection, the diacetylamino derivative is rapidly excreted, and adequate contrast can be obtained in 7 min. The adipyl derivative, which is first taken up by the liver, is subsequently excreted in the bile, and visualisation of the gall-bladder can be achieved in 2-3 hr. The degree of contrast was adequate in almost every case, and no reactions were observed. The sodium salt of 3·5-diacetylamino-2.4.6.-triiodobenzoic acid has also been suggested for use as a contrast agent for X-ray visualisation of the gastro-intestinal tract. Barium sulphate is the substance most frequently used for this purpose, but it is not entirely satisfactory. Zirconium dioxide has been suggested but Robinson[11] and Levene consider the triiodobenzoic acid compound worthy of trial. These workers found that the results were, in general, as good as those obtained with barium sulphate. The slight diarrhœa experienced by some patients was far less troublesome than the constipation that invariably follows the administration of barium sulphate. Modification of the formula to increase the viscosity of the product might add to its usefulness, and further investigation into the oral use of such contrast agents may prove rewarding.

Urethrography presents problems of its own, and a number of products, such as iodised oil, have been used for this purpose, but few are entirely satisfactory. Such oily products are not always safe, as there is the possibility of oil embolism if pressure is used when injecting the contrast agent. In many conditions needing urethrography the vascular tissues are unusually accessible and so potentially vulnerable. The entry of any contrast agent into the vascular system could therefore occur relatively easily. The ideal contrast agent in such circumstances is one characterised by easy miscibility, good and even coverage, low toxicity and adequate X-ray density. Mixture of contrast agent and a water-soluble jelly is not satisfactory, but Thompson[12] has reported on the use of amioca in this way. Amioca is a non-gelling starch consisting almost entirely of amylopectin. This has valuable thixotropic properties, and when mixed with a contrast agent forms a product with a highly variable viscosity. When injected into the urethra, the product flows easily at first, but the unique thixotropic properties soon inhibit the flow, and permit the retention of the medium at the point of rest for several minutes. In clinical trials the coverage given by the product was found to be good, skip areas were few, and good shadows were obtained.

As contrast agents for outlining visceral organs, air and oxygen have been used by insufflation into the retroperitoneal space. This method can be a valuable diagnostic device, but owing to the dangers of gas embolism the method is now seldom used. Recently, Blakemore[13] *et al.* have tried to revive interest in the method by using carbon dioxide in retroperitoneal pneumography. This gas is 20 times more soluble in blood than air or oxygen, and it is therefore correspondingly safer if insufflated into body cavities. In the process 900-1,500 c.c. of gas were used, and as the gas is rapidly absorbed, it was necessary to take the films as soon as possible. Results thus obtained were encouraging, but any delay beyond about 20 min. after insufflation gave poor films owing to loss of contrast.

Teplick[14] *et al.* have reported enthusiastically on a new oral choleocystographic compound. This substance is 3(3-aminobutyl-2.4.6.-triiodophenyl)-2-ethyl-acrylic sodium, also known as *Orabilex*.

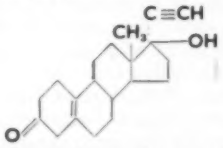


This drug was given orally in doses of 6 g. to all adult patients requiring choleocystography, regardless of bodyweight. This is double the dose of iopanic acid, the contrast agent usually employed, and correspondingly denser shadows were obtained. This improved visualisation was achieved with a marked reduction in side effects, and the virtual elimination of vomiting and diarrhœa. This absence of gastro-intestinal irritation was a noteworthy feature of the investigation. Visualisation of the gall-bladder and the common bile duct were consistently obtained, and colonic opacities, which frequently hinder accurate observation, were minimal and almost non-interfering. This enthusiastic report should arouse considerable interest.

Uræmia

In acute renal failure one of the principal aims of therapy is to reduce protein breakdown. This slows down the rate of formation of urea, and gives damaged tissues further time for readjustment and recovery. This process is assisted by the administration of fats and carbohydrates and the reduction of electrolytes. Even in such circumstances the rate of protein breakdown may be dangerously high when renal failure is present, and McCracken[15] and Parsons have examined the value of anabolic hormones in such conditions.

Testosterone has but a limited use in uræmic states, but encouraging results were obtained with some of the non-virilising analogues such as norethandrolone (17-hydroxy-19-nor-17∝-pregn-4-en-3-ne). When



this compound was given, a distinct reduction in urea formation occurred indicating a reduced rate of protein catabolism. Uræmic intoxication is a progressive condition, and a drug that can inhibit urea formation may be of great value at the critical stage.

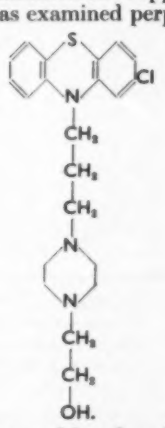
These 19-nor-steroids open up a new approach to the immediate problems connected with a rising concentration of blood urea, although final recovery will always depend on a restoration of normal renal function.

Ferrous sulphate

This compound has long been acknowledged to be one of the most effective oral preparations of iron available, but the high incidence of side effects, possibly associated with the use of unnecessarily high doses, has led to the introduction of a wide range of expensive alternatives. Price[16] and Brierly have re-examined this problem of side effects, and have used smaller doses of ferrous sulphate in the form of an uncoated tablet. Each tablet contained 300 mg. of exsiccated ferrous sulphate and 200 mg. of magnesium aluminium hydroxide, and in order to check the rate and degree of absorption, the salt was tagged with radioactive iron. Administration of these tablets was marked by a complete absence of side effects, even in patients known to be intolerant of other oral iron preparations. Adequate absorption was proved by a satisfactory rise in hæmoglobin and reticulocyte levels. Contrary to previous belief, the presence of the buffer did not interfere with absorption of the iron. This was considered to be due to the adsorption of phosphorus complexes which usually prevent the full utilisation of the iron. The use of buffering substances appears to enable smaller doses of iron to be given without loss of activity, and suitably formulated commercial products may re-establish ferrous sulphate as the best general remedy for the treatment of iron-deficiency anæmias.

Anti-emetics

The introduction of that protean compound chlorpromazine marked an advance, among others, in the treatment of intractable vomiting. It has also proved a valuable tool in examining the causes of emesis. Following experiments with anti-emetics against apomorphine-induced vomiting, a chemoceptive emetic-trigger zone in the area postrema has been suggested. Animals deprived of this zone are resistant to the emetic action of apomorphine, but the vomiting centre is still intact, as the animals respond to the emetic action of orally administered copper salts. Wang[17] has examined perphenazine

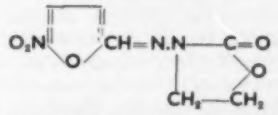


in this way, and has found the new compound to be much more powerful than chlorpromazine when using lanatoside C as the emetic agent. That substance is known to provoke long attacks of intractable vomiting, which cannot be controlled by chlorpromazine, presumably owing to the strong affinity of the glycoside for the receptor site. Perphenazine appears to have a greater affinity than lanatoside C for these receptor sites, and consequently can displace the glycoside, and following such displacement the vomiting ceases. The new compound, also known as Trilafon, has considerable value in post-radiation and post-operative vomiting, and in controlling the more severe aspects of the nausea and vomiting of pregnancy.

Trichomoniasis

The results of therapy in this condition are highly variable, and in consequence a wide variety of compounds have been used in treatment, often with disappointing results. To be effective, a trichomonacide must have the power of penetrating and dissolving mucoid substances, be well tolerated by already inflamed tissues, and be highly lethal to the invading organisms. In an attempt to satisfy these criteria, Giorlando[18] and Branat developed a combination of three substances; a chelating agent (ethylene-diamine-tetra-acetic acid) to remove calcium from the calcium proteinate present in the membrane of the parasite; a wetting agent (sodium di-octyl-sulphosuccinate) to lower the surface tension and to assist in removing lipid material; and a detergent (poly-ethylene-nonyl-phenol) to denature the protein. Using a preparation of this type, encouraging results were obtained. Negative cultures for three months after cessation of treatment were regarded as a cure, and in a series of 58 patients a cure-rate of 93% was achieved, which is an excellent response in a disease admittedly difficult to treat.

Good results have also been claimed by Bach-Nielson,[19] using a new nitrofuran derivative. This substance [N-(5-nitro-2-furfurylidene)-3-amino-2-oxazolidine] was



used as the only chemotherapeutic agent in a series of 30 patients, and was applied as a powder, spray or pessary. The characteristic symptoms of the disease disappeared after treatment in 90% of the patients, and 80% remained symptom-free after an observation period.

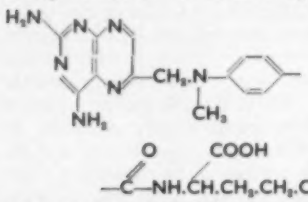
Tetrahydroaminacrin

This substance was originally synthesised by Albert[20] during work on acridine antiseptics, but was

found to be devoid of bacteriostatic properties. Later work showed that the drug has some eserine-like activity, and Gershon[21] and Shaw have re-investigated this aspect of the compound more thoroughly. It can reverse the narcotic action of morphine, and is almost as powerful an anticholinesterase as eserine or neostigmine. Clinically it can neutralise the curarising action of gallamine and tubocurarine, but does not produce any undesirable atropine-like side effects unless large doses are given. In addition it also has a mild action as a respiratory stimulant. This unusual combination of properties has considerable interest from the clinical point of view, and requires further investigation.

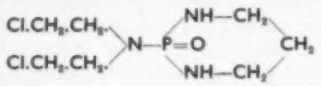
Cytostatics

With the increasing knowledge of cytoplasmic processes, cytostatic drugs are being used with increasing precision. Herz[22] *et al.* have reported on the treatment of choriocarcinoma and related tumours with folic acid antagonists, particularly with *Methotrexate* (4-amino-N^{10}-methylpteroylglutamic acid), formerly known as *a*-methopterin.



The high folic acid requirements of rapidly growing fœtal and maternal tissues has long been known, and Herz reasoned that tumours involving or arising from the uterus might well have similar requirements. If so, the tumours should respond to treatment with folic acid antagonists. The type of tumour was indicated by the high urinary excretion of chorionic gonadotrophic hormone, and the drug was given in doses of 10-30 mg. daily for five days, usually by intramuscular injection. The initial response to treatment was remarkably consistent, and the period of remission varied from 2-29 months. The treatment was intensive, and the side effects sometimes severe, but these should be viewed against the results obtained, and accepted as a justifiable risk in view of the high morbidity of the disease.

Research on new derivatives of nitrogen mustard continues, and Brock[23] and Wilmanns have attempted to apply Druckrey's principle to this type of drug. This principle is that drugs can sometimes be made more selective in action by the conversion of an active compound into a relatively inactive and well tolerated "transport" derivative. These transport forms are subsequently broken down in the body, especially in the tumour cells, with the liberation of the active form of the drug. An earlier derivative of this kind was nitrogen mustard amine oxide, but this was easily decomposed by simple hydrolysis, and was not sufficiently selective in action. In view of the high enzyme content of tumour tissues, it was thought that phosphamides might possess the required selective action, and Brock[23] and Wilmanns found that N.N-bis-(β-chloroethyl)-N'-O-propylene-phosphoric acid ester diamide had some of the required

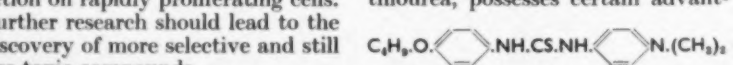


characteristics. The reactivity of the β-chloroethyl groups was much lower than that of the parent substance, and when tested against malignant cells in culture the new compound had no cytostatic effect. When injected, however, it showed marked activity, indicating conversion into an active form. Gross[24] and Lambers have used this derivative, also known as *Endoxan*, in a variety of neoplastic conditions of the lymphoid and hæmopoietic systems. It was given in doses of 150-200 mg. daily by intravenous injection up to a total of 2-7 g. followed by oral maintenance doses daily of 80-100 mg. to a total of 25 g. Good results were obtained in lymphosarcoma, as regression and long remission occurred, and some cases of Hodgkin's disease also benefited. The response in myeloid leukæmia was disappointing, but the work shows that it is now possible to devise certain cytostatic drugs with a more or less selective action on rapidly proliferating cells. Further research should lead to the discovery of more selective and still less toxic compounds.

Some interesting work with nitrofurazone in the treatment of metastatic testicular tumour is the subject of a report by Szczukowski[25] *et al.* This substance has been employed in dermatology as an antiseptic, and was used by Wildermuth[26] in 1955 for testicular cancer, but the initial favourable response was marred by a later peripheral neuropathy. In this new investigation the drug was used in doses of 0·5 g., after surgery and irradiation of the primary tumour, in an attempt to control secondary pulmonary lesions. Side effects such as vomiting were severe, but could be reduced by anti-emetics, and treatment resulted in a complete disappearance of the metastatic lesions. Nitrogen mustard is also of value in treating certain metastatic manifestations, and Fullerton[27] and Reed have found it helpful in the treatment of pleural and peritoneal effusions due to metastases from tumours of the breast or ovary. It was given in a single large dose (0·4 mg./kg. bodyweight) directly into the body cavity, without previous aspiration of any fluid. This was done to minimise general side effects, as the proteins in the pleural fluid combine with the mustine and prevent absorption. Nausea can be minimised by the administration of barbiturates and chlorpromazine. The treatment is not new, but as it presents no radiation hazards, and is more readily available than radioactive gold, it is regarded as the treatment of choice for malignant effusions. Similar doses have been given by Krakoff and Sullivan as a single intra-arterial injection in the treatment of pelvic cancer. The results were encouraging, as the tumour size decreased, and pain and obstructive neuropathy were also relieved.

Leprosy

The introduction of dapsone marked a great advance in the treatment of leprosy, and hydnocarpus oil is now used only when cheapness and availability control the choice of drug. Even with dapsone, however, treatment must be prolonged, but Davey[29] *et al.* have had good results with thiocarbanilide. This substance, also known as DPT, Ciba 1906, or 4-butoxy-4'-dimethylamino-diphenylthiourea, possesses certain advant-



ages over dapsone. It does not cause central depression, indeed some patients experience euphoric effects, and although extended treatment is still necessary, this period is not so long as that required with dapsone. The dose given varied from 25 to 40 mg./kg.

bodyweight daily, but few patients had more than 2 g. a day. This new compound appears to be of considerable potential value in the control of leprosy, as the margin of safety is wide, the clinical response is rapid, and it has the additional advantage of being well tolerated by children.

A preliminary statement concerning another anti-leprosy drug has been made by Rose,[30] referring to *Etisul*, or compound 15688. This substance, the bisethylthio ester of isophthalic acid, is remarkable in that it is effective when applied to the skin by inunction. Further, it also reduces the infectiveness of the disease, so that after three months' treatment, although not yet cured, the patient is no longer a danger to the community, and may return to a more normal existence. This simple but effective method of application has obvious advantages in the treatment of lepers in primitive societies, as the supervision required is minimal and overdosage unlikely. The action of the drug appears to be associated with the release of ethylmercaptan. This substance has both anti-leprosy and anti-tubercular properties, but it is not suitable for medicinal use as such. Further work on associated compounds, and the nature of the metabolite finally responsible for the therapeutic action of the drug, is proceeding.

REFERENCES

1. D. Rochelle and R. V. Ford, *Amer. Heart J.*, 1958, **56**, 463.
2. S. Locket, *B.M.J.*, 1958, *ii*, 74.
3. A. M. Master, *Amer. Heart J.*, 1958, **56**, 570.
4. T. Cesarman, *Arch. Inst. Cardiol.*, 1957, **27**, 563.
5. M. K. Towers and P. Wood, *B.M.J.*, 1958, *ii*, 1667.
6. M. Toohey, *ibid.*, 1958, *ii*, 892.
7. S. Baer *et al.*, *J.A.M.A.*, 1958, **167**, 704.
8. G. Kellaway, *B.M.J.*, 1958, *ii*, 889.
9. F. R. Rullo *et al.*, *J.A.M.A.*, 1958, **168**, 743.
10. T. L. Orloff, *Amer. J. Roentgenol.*, 1958, **80**, 618.
11. D. Robinson and J. M. Levine, *ibid.*, 1958, **80**, 79.
12. I. M. Thompson, *ibid.*, 1958, **80**, 627.
13. W. S. Blakemore *et al.*, *J.A.M.A.*, 1958, **167**, 310.
14. J. G. Teplick *et al.*, *Amer. J. Roentgenol.*, 1958, **80**, 961.
15. B. H. McCracken and F. M. Parsons, *Lancet*, 1958, *ii*, 885.
16. A. H. Price and J. Bierly, *J.A.M.A.*, 1958, **167**, 1612.
17. S. C. Wang, *J. Pharmacol. Exp. Therap.*, 1958, **123**, 306.
18. S. W. Giorlando and M. L. Brandt, *Amer. J. Obst. Gynec.*, 1958, **76**, 666.
19. P. Bach-Nielson, *Ugeskr. f. Laeger*, 1958, **120**, 192.
20. A. Albert and Gledhill, *J. Soc. Chem. Ind.*, 1945, **64**, 169.
21. S. Gershon and F. H. Shaw, *J. Pharm. Pharmacol.*, 1958, *x*, 638.
22. R. Hertz *et al.*, *J.A.M.A.*, 1958, **168**, 845.
23. N. Brock and H. Wilmans, *Deutsch. med. Wochensch.*, 1958, **83**, 453.
24. R. Gross and K. Lambers, *ibid.*, 458.
25. M. J. Szczukowski *et al.*, *J.A.M.A.*, 1958, **167**, 1066.
26. O. Wildermuth, *Radiology*, 1955, **65**, 599.
27. C. W. Fullerton and P. I. Reed, *Canad. Med. Ass. J.*, 1958, **79**, 190.
28. I. H. Krakoff and R. D. Sullivan, *Ann. intern. Med.*, 1958, **48**, 839.
29. T. F. Davey *et al.*, *Leprosy Review*, 1958, **29**, 15.
30. F. L. Rose, *J. Pharm. Pharmacol.*, 1958, *x*, Supplement 35T.

FERTILISERS and Plant Nutrients

Non-phosphate compounds • Granulation • Secondary nutrients
U.K. use of N P and K • Fertilisers and animal health

By D. P. Hopkins, B.SC., F.R.I.C.

Non-phosphate compounds

IN late 1958, I.C.I. announced a new granular compound, *Kay Nitro*, 16--0--16. The production of granular mixtures without phosphate as an ingredient is difficult. The phosphate functions as plasticiser and stimulates granule formation; conversely, an excessive proportion of soluble, crystalline materials in the mixture, which occurs when formulations high in N and K are aimed at, is adverse to granulation. The method by which *KayNitro* is being produced in U.K. has not, it is thought, been described in detail; but a new method for producing N—K granular compounds has recently been outlined in U.S.[1] The principle of the method is simple. Normally, when using nitrogen solutions (as is common U.S. practice), free ammonia must be neutralised and for this purpose superphosphate is relied upon or calculated amounts of acid are added. The basic step in the new process is to neutralise free ammonia in the nitrogen solution with acid as a pre-granulation and pre-mixing step; the solution, thus neutralised in a tank, is led into contact with other solid components of the mixture and granulation can be efficiently obtained. At one plant where this flowline is adopted, 8-0-24 and 14-0-14 compounds are being regularly made, all or very much the most part of the N being of solution origin. Dolomite is stated to be the most suitable "filler" as it acts as an anti-acid when too much acid has been used but does not liberate ammonia. The process not only eases production problems for non-phosphate NK formulations, but also suits high-N NPK formulations such as those with a 2-1-1 ratio. The pre-neutralisation requires careful control. Over-acidity promotes ammonium bisulphate formation which leads to a hygroscopic product; it also brings the risk of extra fume formation, corrosion, and loss of N as nitric acid or nitric oxides during granulation.

Though much of the interest in nitric acid treatments of phosphate rock has waned with the changed world sulphur outlook, nitrophosphate process developments continue to be reported. Two TVA papers[2,3] have shown that ammoniation and granulation may be operated simultaneously and with advantages over the more normal procedure in which ammoniation precedes granulation. The acid reactant may be a mixture of nitric and sulphuric acids instead of nitric acid alone, or phosphoric acid may also be introduced; the process therefore offers wide versatility. A higher proportion of the final phosphate is producible in water-soluble form, *e.g.*, 27% in a 12-12-12 grade was water-soluble compared with 17% in a similar compound made by ordinary pre-ammoniation method. (However, this improvement is still a minor one for countries whose legislation makes water-solubility the highest criterion.)

If drying led to final NPK products with 1·6% or less of moisture, bag setting was minor when the final product had also been given a conditioning period prior to bagging. This matter of freedom from setting in store is, of course, the "acid test" of such a process, which obviously puts hygroscopic and crystallising salts heavily into the ultimate mixture's composition, *e.g.*, ammonium nitrate, potassium nitrate, and perhaps some calcium nitrate. The TVA work having been done on pilot-plant scale, using a continuous ammoniator, it is always possible that large-scale plant operation may produce material with greater bag-setting problems. The other TVA paper reports a more general study of ammoniating nitric acid extracts of phosphate rock. It is shown that fluorine in the rock has a markedly adverse effect on the process, but this effect can be prevented if 90% of the fluorine is removed from the extract by precipitation and filtration before ammoniation is carried out. The removed fluorine can be recovered.

Granulation

A valuable British paper[4] has surveyed the whole field of granulation as an industrial process applied by many different methods to a variety of materials. Attention to fertiliser granulation is limited, but this contribution should stimulate a broader approach to granulation technology, based more upon the fundamental physico-chemistry of granule formation and less upon empirical, trial-and-error findings. To quote: "... a functional analysis of the results obtained with any machine used in the process, interpreted by means of the fundamental principles even if these are incompletely understood, proves helpful in the development and design of equipment for the process."

Secondary nutrients

Continued field work with *iron chelates* has been reported from Long Ashton[5] and the most effective such chelate so far tested in the field is *Chel*-138, which is the iron salt of ethylenediamine bis (*o*-hydroxyphenylacetic acid), or Fe-EDHPA. Fruit trees suffering from chlorosis were controlled by only 1 g. of iron per tree soil-surface applied as *Chel*-138, but more iron was needed with other chelates. The control achieved has lasted for two seasons. The weakness of iron chelates in soil action is their lack of stability in the presence of an excess of calcium ions; the chelates most resistant are those with a phenolic ring structure. As iron chlorosis is often induced by high *p*H conditions, *viz.* in calcareous soils or by overliming, this chemical distinction seems of major practical importance.

The dramatic use of *molybdenum* on Australian and New Zealand soils is now well known. Small dressings of a few pounds per acre have brought about large increases in pasture output, and this may be associated with other studies of molybdenum's plant-nutritional rôle which have shown it to be particularly important for legume growth. The effect of curing an inherent molybdenum deficiency is to promote cloyer growth, with resultant increases in the soil's herbage output and nitrogen status. Formerly, soil reserves of molybdenum were made more available by heavy liming. The practical conclusion drawn from these Oceanic developments is that a few pounds per acre of molybdenum can achieve the former results of tons of lime. This is a misleading generalisation if given wider application, however, for liming in most parts of the world is required for other important considerations besides that of molybdenum availability; in Australia and New Zealand, the previous approach had been that of heavy liming to deal with an obdurate molybdenum deficiency.

Nevertheless, some use of molybdenum in place of full lime requirement is foreshadowed in a recent report[6] on problems of Welsh farming, a report which also has considerable application to problems of upland soil farming in other areas in the U.K. The application of large lime dressings, even though these may be known to be required, is often difficult and costly for high upland acreages which may be poorly accessible for machinery. The suggestion is made that small lime dressings may be adequate for re-seeding or for otherwise improving pasture on such land if in addition small molybdenum dressings are given. The suggestion is backed by some experimental work in Wales which has shown that molybdenum and phosphate dressings have been of great benefit. Research on this possibility is called for. The object of using molybdenum is to prevent the dying out of clovers in the pasture herbages. Such basic work as has already been done is merely referred to and not described in the report; it may be deduced, however, that the molybdenum is more likely to be applied in mixture with superphosphate than with the lime. Aerial dressings of elevated pastureland with molybdenised-superphosphates can perhaps be visualised as an eventual development.

German work[7] suggests that *magnesium* uptake is better favoured by nitrate fertilisers than by ammonium fertilisers, and it is considered that the application of a nitrate may cause better magnesium uptake than small magnesium compound dressings. The same paper expresses preference for magnesium carbonate as a source of magnesium as compared with magnesium sulphate, though the carbonate is slower; and the simultaneous application of chalk with magnesium salts is recommended as a method of securing better magnesium uptake by crops. This work can be interestingly linked with the development of an ammonium nitrate fertiliser in which dolomite instead of calcium carbonate is used as the diluent to control hygroscopicity; such a fertiliser has been announced for British marketing in 1959.

U.K. use of N, P, and K

Cooke[8] has provided a major review of British use of the three main fertiliser plant foods, and any summary of a paper so packed with data and comment is apt to be misleading; it should be read in entirety. A table gives data, only approximate for earlier figures, for U.K. consumption of fertiliser N, P, and K from 1837 to 1957. Possibly the most reliable and striking comparison to be extracted is for 1913 and 1957, thus:

			N	P_2O_5	K_2O	
1913	...	...	29	180	23	} 1,000s of tons
1957	...	...	302	370	338	

Imported feeding stuffs also, though less directly, add nutrients to our soils, and for 1956 the comparison of this source and the fertiliser source was as follows:

		N	P_2O_5	K_2O	
Imported feeding stuffs	...	158	121	63	} 1,000s of tons
Fertilisers	...	291	386	328	

An attempt is made to draw up a balance sheet for the three nutrients

for U.K. farming *in toto*. This, like other similar attempts in the past, encounters the difficulty of assessing nitrogen gains from biological fixation; also, this kind of arithmetic or accountancy cannot adequately allow for the question of phosphate availability. However, it is shown that N, P and K additions p.a. exceed losses; by 40,000 tons for nitrogen; by 370,000 tons for phosphate (as P_2O_5); and by 90,000 tons as potash. There is an implied conclusion that we are over-applying phosphates while only maintaining the N and K supply positions by small margins. The validity of this view depends wholly upon the value, in terms of real availability, of the accumulated phosphate surpluses; a revised and more optimistic view of phosphate reserves value is mentioned.[9] The main prospects for *major* increase in U.K. fertiliser use are once again associated with grassland use.

In the last but one Report (see MANUFACTURING CHEMIST, September 1958) the first part of the report on the 1957 fertiliser practice survey was discussed; since then, a second part has become available,[10] with data for another 21 districts. This additional information does not affect the main conclusions drawn from data for 13 districts, but it enables a more detailed picture of national use to be depicted. Thus, it can be shown both for cereal and grassland fertilisers that there is a definite trend for more fertiliser per acre to be applied on larger farms than on smaller farms. If farming is classified into three broad area-types—mainly arable, lowland and mainly grassland, upland and mainly grassland—national practice can with fair consistency be correlated with these different farming systems, thus:

Average rates of application per acre, 1957
(cwts. per acre)

	N	P_2O_5	K_2O
To arable crops:			
In arable areas	0·44	0·37	0·52
In lowland grassland areas ...	0·25	0·30	0·30
In upland grassland areas ...	0·18	0·42	0·25
To temporary grass:			
In arable areas	0·24	0·18	0·17
In lowland grassland areas ...	0·19	0·24	0·15
In upland grassland areas ...	0·10	0·24	0·11
To permanent grass:			
In arable areas	0·14	0·12	0·08
In lowland grassland areas ...	0·07	0·16	0·06
In upland grassland areas ...	0·03	0·18	0·04

These differences in average rates per acre are very marked. Except for sugar-beet, well manured wherever grown, and for potatoes to a rather lesser extent, these farming-area differences in rates apply to all crops. It is difficult to appreciate why it should be less advantageous to grow a maximum yield of wheat or barley on a farm in a dairying area than on a farm in an arable area. A crop shown to be variably treated with fertilisers, despite its fodder importance as a converter of nitrogen into protein and starch, is kale. A conclusion is reached, perhaps tentatively, that there is little further scope for increasing yields of cereals by using more fertilisers in the arable districts of Eastern England and the South. Not everyone will agree that the survey's data justify this conclusion. The rates for cereals in the Eastern Counties, though commendably high, are still much below optimum nitrogen rates estimated from 1945-55 field trials by Bullen and Lessells (see MANUFACTURING CHEMIST, December 1957). The rates for cereals in Southern England are somewhat lower still, and the survey data for this large arable area are based *only upon four* district surveys, which may well be an insufficiently large sample.

Fertilisers, grassland and animal health

The Survey just discussed and the paper by Cooke referred to before it, both show that grassland needs represent the main opportunity for further and large fertiliser expansion. However, the report on Welsh farming's problems (also see above) and the recent report from the Committee on Grassland Utilisation[11] have each stressed the urgent need for more knowledge about animal health reactions to increased reliance upon grass in animal diet. The point is put with clearest force in the former: "We were told on numerous occasions that whilst there were problems of animal health on unimproved grassland, such troubles were greatly accentuated as soon as swards were improved. . . . Thus we had statements that the improved strains of grass were responsible, or that seeds mixtures were too simple compared with what they used to be, or that the intensive use of nitrogen leads to increased growth which rapidly exhausts the soil of trace elements. It might well be that the problem is a complex of these things coupled with the heavier stocking of the land." The Grassland Utilisation Committee's report says: "An important influence working against the intensive use of grassland is the fear felt by many farmers that improved grassland will bring with it dangers of increased animal health disorders. . . ." Hypomagnesæmia, parasitism, livestock infertility and bloat are specifically mentioned. Intensified research on these disorders is urged whether or not they are connected in incidence with grassland improvement. There is elsewhere in this report a suggestion that hypomagnesæmia's incidence risk may possibly be increased by the use of potash on grass in *spring* dressings given as compounds when nitrogen is also being given. Application of potash separately after spring and summer peaks of growth may be preferable through the lessened risk of causing a potash antagonism to magnesium uptake. (Measured evidence on which this suggestion is based is not cited, like the suggestion about molybdenum use in the Welsh report.)

This fresh insistence that animal health reactions cannot be ignored in discussions about increased use of fertilisers on grass is timely, and may well be considered belated. Sick cows or dead cows represent an economic loss that immediately outweighs expected benefits from increases in grass productivity. Isolated farm cases where this has occurred do not always remain isolated in argument and effect. To discuss these problems openly does not revive the faded and extremist theme about fertilisers causing impaired health; on the contrary, exaggerations can be put into perspective, and research may be able to modify fertiliser practices so that risks are obviated.

REFERENCES

1. Anon., *J. Agric. and Food Chem.*, 1958, **6**, 806.
2. T. P. Hignett, M. R. Siegel, D. McKnight, and F. P. Achorn, *ibid.*, 1958, **6**, 822.
3. J. C. Brosheer and F. A. Lenfesty, *ibid.*, **6**, 827.
4. W. C. Peck, *Chem. & Ind.*, 1958, **51**, 1674.
5. *Long Ashton Annl. Rept., 1957*, 1958, **27** and **28**.
6. "Technical Problems of Welsh Agriculture," Min. of Agric., 1958, *H.M.S.O.*, pp. 20, p. 8.
7. C. Pfaff and A. Buchner, *Z. PflErnahr. Dung.*, 1958, **81**, 202.
8. G. W. Cooke, *J. Sci. Food and Agric.*, 1958, **9**, 761.
9. R. G. Warren, *Proc. Fertil. Soc.*, 1956, No. 37.
10. Survey of Fertiliser Practice, 1957, Part II, 1958, pp. 57.
11. "Report of Committee on Grassland Utilisation," 1958, H.M.S.O., Command Paper 547, pp. 124.

Analytical Chemistry

By W. I. Stephen, PH.D., A.R.I.C.

Essential oils and perfumery • Detergents • Plant growth hormones • Fungicides and pesticides • Fine chemicals Hormones • Antihistamines • Antibiotics • Vitamins Alkaloids • Drugs • Pharmaceuticals • Fats and oils

THE ANALYSIS of essential oils and related products is of importance to manufacturing and cosmetic chemistry. This is realised by the Society for Analytical Chemistry, which has a separate Sub-committee in its Analytical Methods Committee to deal exclusively with the problems arising in this field of analysis. The British Standards Institution is also active in proposing standards of purity for a large number of these materials. A few analytical procedures have been described in the literature since the last report.

Essential oils and perfumery

Vapour phase chromatography is ideally suited for the analysis of perfumes and perfumery materials. Tuey[1] has given a good account of the principles involved in the separation of volatile mixtures by this technique and its application to the analysis of essential oils and related materials. New British Standards[2] give details of the more important physical properties of a number of essential oils, including oils of cananga, celery seed, cinnamon leaf (Ceylon and Seychelles), cubeb, lavandin, Japanese mint, sage, spearmint, and neroli.

Carvone and other ketones have recently been determined[3] by a colorimetric method in which the carvone-containing oil is treated with an ethanolic solution of ethyl 3 : 5-dinitrobenzoate and alkali. A maximum at 537·5 mμ is obtained which enables the carvone content of the oil to be determined by reference to a previously prepared calibration graph.

Crude essential oils lower the accuracy of the procedure so that a preliminary treatment with activated charcoal is recommended.

Detergents

A useful procedure for the determination of non-ionic detergent in soap mixtures has been described by Stuffins.[5] The detergent is separated from the soap and inorganic material by solution in dioxan. The dioxan extract is then diluted with water and the detergent is precipitated as a phosphomolybdate complex. After a suitable storage period, the complex is filtered off, washed with a small amount of water, dried at 100°C., and then weighed. Jerkovits[6] determines the unsulphonated material in fatty alcohol sulphates by a volumetric method. The material in the form of a paste is first treated with aqueous ethanol, then acidified and extracted with light petroleum. The solvent is removed and the dried residue is weighed. The fatty alcohol sulphate in the aqueous phase is determined by precipitation with *p*-toluidine hydrochloride after removal of ethanol; the complex so formed is extracted with ether and added to ethanol, neutralised to cresol red, and titrated with 0·1 *N*-caustic soda. Free *p*-toluidine hydrochloride in the extract is determined by Mohr's titration. The molecular weight of the fatty alcohol can be computed from the weight of the residue obtained by drying an aliquot of the *p*-toluidine complex solution.

Blank[7] has recently carried out a critical survey of methods for the analysis of alkylbenzenesulphonates, particularly sodium dodecyl- (or pentadecyl-) benzenesulphonate. Full analytical details are given for the determination of the alcohol-soluble material, the active component (by cationic titration), and the neutral oil and water.

Plant growth hormones

The photometric determination of indol-3-yl-acetic acid has been examined by Pilet,[8] who was concerned with a study of the auxin oxidase in plant tissue. The substance reacts with ferric chloride in acid medium to give a colour suitable for photometric measurement.

Best results were obtained using amounts of auxin in the range 0·25-10 μg. per ml. and treating this solution with a reagent containing 3 ml. of 1·5 *M*-ferric chloride, 60 ml. of concentrated sulphuric acid and 100 ml. of very pure water (redistilled and deionised). The colour is allowed to develop in darkness for 12-20 min. and readings are taken with a photoelectric colorimeter (535-mμ filter). Little or no colour is produced by a number of similar indole derivatives, including the corresponding propionic and butyric acids.

Fungicides and pesticides

Details of the CS_2 evolution method for the determination of dithiocarbamate residues include size of reaction flask, use of all-glass joints, increase in contact surface of absorption reagent and limitation of sample size to give a maximum evolution of 100 μg. of CS_2.[9] Recoveries in the range 89-102% are obtained. Using E.D.T.A., recoveries of at least 90% of zinc and manganese (zineb and maneb) are obtained.

Paper chromatography is used to separate and identify the rodenticides, *a*-naphthylthiourea (antu), pindone (Pival), and 3-*a*-acetonylbenzyl - 4 - hydroxycoumarin (Warfarin).[10] In the procedure described, the immobile solvent system is 4% dimethylacetamide in diethylether and the mobile solvent is a mixture of octanes; the chromatogram so obtained is examined under U.V. light. The pesticides show the following colours in ascending order: Warfarin, purple; antu, bright blue; pindone, buff. The appropriate R_F values are given. Ultra-violet spectrophotometric constants for maximum activation and fluorescence peaks of a number of pesticides are given by Hornstein.[11] Included in the list are Guthion, potason, Warfarin, piperonyl butoxide and *n*-propyl isome. A number of other pesticides were examined but these did not show any fluorescence.

Fine chemicals

Polyfunctional phenols are determined[12] by treating them with an ammoniacal solution of amidopyrine and potassium ferricyanide. The colour so produced is stable for a considerable period, and may be measured photometrically at 428 mμ. The method has been used to determine phenol, *o*- and *m*-cresols, technical cresol mixtures, 2 : 5-xylenol, resorcinol, quinol and catechol. Very small amounts of nicotinic acid and its esters have been detected by using the colour reaction produced with 1-chloro-2 : 3-epoxypropane.[13] Paper chromatography is used to separate the substances, the solvent being *n*-butanol saturated with aqueous ammonia. The RF values are very close, but correct identification of 0·5 μg. of nicotinic acid and 5 μg. of tetrahydrofurfuryl, methyl, and *n*-heptyl nicotinates has been obtained.

Tartaric acid and tartrates have been determined oxidimetrically.[14] Dichromate and ceric salts were examined as possible oxidants and the dichromate solutions were preferred. Excess dichromate is added to the sample and the excess oxidant is determined by titration with standard quinol using potentiometric control.

The colorimetric determination of vanillin using the Folin-Denis reagent has recently been examined by American workers.[15] They find that the addition of 1·25 g. of sodium carbonate per 100 ml. of vanillin solution containing 5 ml. of reagent results in the formation of a satisfactory colour after 30 min. Subsequent change in colour is slow and it matters little whether the sodium carbonate is added first or last, provided the reactants are near the final required volume.

Hormones

The separation of œstrogens by chromatography on acetylated cellulose (S. and S. 2043 b) has been described.[16] The œstrogens are spotted on the paper and the chromatogram developed with 80% aqueous methanol for 5 hr. After drying at room temperature, the paper is immersed in a 10% solution of antimony pentachloride in carbon tetrachloride and dried for 3 min. at 80°C. The different colours obtained are characteristic for the separate œstrogens: œstrone, brown; œstradiol, yellow-brown; œstriol, red; equilin, grey-brown; equilenin, green-brown. On ageing of the chromatogram, the colours all change to a dirty brown.

Intermediates in the preparation of stilbœstrol (4 : 4′-dihydroxydiethylstilbene) have been determined by non-aqueous titrimetry.[17] *p*-Hydroxypropiophenone is titrated in anhydrous acetone or acetone-pyridine mixtures with standard potassium methoxide using a 0·1% solution of azo-violet in chlorobenzene as indicator. Two other intermediates are titrated similarly using a neutralised acetone-pyridine-methanol solvent in the proportions 70 : 30 : 2.

Antihistamines

In a new colorimetric procedure for iminazolines, Laubie's colour test has been applied[18] to the determination of 2-anilino-methyl-2-iminazoline hydrochloride, antazoline hydrochloride, tolazoline hydrochloride and naphthazoline hydrochloride. The solution of the compound is treated with *N*-sodium hydroxide and 5% sodium nitroprusside. After 10 min. the mixture is treated with *M*-sodium carbonate and diluted with water. After a further 10 min. the extinction of the solution is measured at 565 mμ. The results show a coefficient of variation of ±2%. The method cannot be used to assay phentolaamine hydrochloride.

Antibiotics

Thorium nitrate reacts with oxytetracycline to form a complex having an absorption maximum at 385 mμ within the *p*H range 3·6-5·4. Use has been made of this fact to determine the antibiotic at concentrations less than 25 μg. per ml.[19] The oxytetracycline is extracted (*e.g.* from urine) with *n*-butanol and the organic layer is shaken up with 1% thorium nitrate. The aqueous layer is then made up to volume with a 3 *M*-acetate buffer (*p*H 4) and the resultant solution is examined spectrophotometrically at 390 mμ. This is an extension of an earlier method for the determination of chlortetracycline;[20] the method can also be used to determine tetracycline, the absorption maximum being at 395 mμ.[21]

Vitamins

An examination has been made of the suitability of a number of chlorohydrins as colorimetric reagents for the determination of vitamin A.[22] Among these are 1-chloropropan-2-ol, 3-chloropropan-1-ol, and glycerol α-monochlorohydrin. Although the last-mentioned reagent gives the most intense colouration, the other two are more suitable because of their greater stabilities. Maximum intensities for these occur at 630 mμ and 550 mμ respectively. Investigations into specificity and interferences are still in progress. Lambertsen and Braekken[23] have studied the losses of vitamin A during chromatography on alumina. The figure of 10% is reduced to about 2% when γ- or δ-tocopherols are present in the proportion of 200 μg. of tocopherols per 1,000 i.u. of vitamin A. A further recommendation is the addition of the unsaponifiable portion of arachis or soya-bean oil to the vitamin A fraction before chromatography of medium and high potency oils.

A sensitive and stable colour reaction for the determination of vitamin K is obtained when the vitamin (250 μg.) in ethanol is treated with a saturated ethanolic solution of 5-imino-1 : 2 : 4-dithiazolidine-3-thione, and the mixture is made alkaline with potassium hydroxide.[24] The colour develops during a 10-min. heating period at 50°C. and the extinction of the cooled solution is measured at 410 mμ. The colour is stable for several hours. Under similar conditions, tocopherol quinone gives only a faint colour, but 2-methyl-1 : 4-naphthoquinone gives a red colour with a maximum absorption at 440 mμ. The method has been used successfully for the determination of vitamin K, in plant material after an initial chromatographic separation of the vitamin.[25]

Alkaloids

Small amounts (less than 1 mg.) of the tropane alkaloids can be detected and determined colorimetrically with *p*-dimethyl aminobenzaldehyde.[26] After extraction, the residue is treated with aqueous bromine, excess bromine is removed and then the reagent (1 g. of the aldehyde in 9 g. of 88% sulphuric acid) is added. After careful heating and cooling, the mixture is diluted with acetic anhydride and the extinction is measured at 500 mμ. Bromauric acid is used for the microchemical detection of a number of alkaloids and organic bases.[27] The products obtained particularly with pyridine and quinoline bases

have been described, but the reagent is very useful for the identification of caffeine, theobromine and theophylline because the crystalline precipitates formed with these substances are readily differentiated.

A paper chromatographic procedure has been developed for the evaluation of *Rauwolfia* root.[28] The crude drug is extracted with hot benzene and finally obtained in chloroform. The chloroform extract is then subjected to paper chromatography (descending technique) using a methanol-formamide solvent (3 : 7) as the stationary phase and benzene-formamide saturated *cyclo*hexane (1 : 1) as the mobile phase. The chromatograms are dried at 90°C. after a 5 hr. development, and the size and intensity of the spots visible in u.v. light are compared with standards. The method has been used on 25 species of *Rauwolfia*.

Drugs

The usefulness of sodium tetraphenylboron (*Kalignost*) as a reagent for organic bases is demonstrated by a procedure described for the quantitative determination of codeine and amidopyrine.[29]

These and other organic bases react with *Kalignost* to form complexes which on treatment with mercuric chloride decompose to form hydrochloric acid. This can then be determined alkalimetrically. Codeine and amidopyrine can be determined in the presence of one another by precipitating the complexes under different conditions. The former precipitates in acid and alkaline medium (*p*H 4-5 and *p*H 10), whereas the latter only reacts at *p*H 10. The method has been applied successfully to the analysis of simple mixtures of the two compounds, and pharmaceutical preparations which contained in addition phenacetin and caffeine.

The non-aqueous titrimetry of barbituric acid and its derivatives has been studied for the solvent systems, benzene - *iso* - propanol (10 : 1) and benzene-chloroform.[30] Tetra-*n*-butylammonium hydroxide is used as titrant in benzene solution and the end-point is detected potentiometrically. A visual titration with thymol blue as indicator gives very precise results showing recoveries of more than 99% with most barbiturates.

Interesting observations have been made on the precipitation of methylphenobarbitone by sodium cobaltinitrite.[31] The sodium salt of this drug when treated with a *freshly* prepared solution of sodium cobaltinitrite produces a precipitate which was commonly assumed to arise through complex formation. However, it is now shown that the precipitation results from a shift in the *p*H value of the original solution from 9·3-9·4 to 5·4-5·6 and the free acid precipitates. This reaction is used to determine the barbiturate. In the presence of phenobarbitone the precipitate is contaminated as a result of co-precipitation, but recrystallisation effects its complete purification. Emphasis is placed on the use of fresh cobaltinitrite solution; aged solutions generally result in the precipitation of some cobalt hydroxide.

Pharmaceuticals

A quantitative iodometric procedure is described for the volumetric determination of 8-hydroxyquinoline-5-sulphonic acid.[32] An alkaline solution of the compound is treated with excess standard iodine solution and iodination is allowed to proceed in the dark for 5 min. The solution is then acidified, potassium iodide is added and the liberated iodine is titrated with thiosulphate. The error is $\pm 0{\cdot}2\%$. When the quinoline derivative is compounded with amidopyrine, the sample is dissolved in 3% alkali and the undissolved material is filtered off.

The determination of betaine in the presence of hexamine can be effected by precipitating betaine reineckate at *p*H 1.[33] The precipitate is filtered off, dissolved in acetone and examined spectrophotometrically at 525 mμ. Piperazine is similarly determined by precipitation at *p*H 2-4.

The procedure can be applied to the determination of strychnal (ethylbetaine sulphate of strychnic acid).

The application of non-aqueous titrimetry to the determination of purine derivatives has been extended to include the determination of theobromine and dihydroxypropyltheophylline (diprophylline) by visual and potentiometric methods.[34] A differential titration can be used to determine the respective amounts of theobromine and sodium salicylate present in pharmaceutical preparations, *e.g.* Diuretin.

Fats and oils

The 1950 edition of B.S. 684 dealing with the analysis of fats and oils has been revised.[35] Several additional methods are given, including determination of melting-points, flow- and drop-points, cloud- and pour-points, smoke- and flash-points, titre, drying-time, viscosity, iodine values, copper and polybromide values. A number of tests for individual oils, cottonseed, sesame and arachis are also described. In a new method[36] for the direct determination of saturated fatty acids in fats, oils and methyl esters, the fat is first refluxed with dry alkaline methanol for 1½ hr., and neutralised to the methyl orange end-point with hydrochloric acid. The methyl esters thus formed are extracted with chloroform and recovered from the solvent by evaporation under nitrogen. The esters are then refluxed with acetone and unsaturated esters are oxidised with permanganate. The saturated esters are subsequently isolated through extraction with chloroform and then weighed.

REFERENCES

1. G. A. P. Tuey, *Soap, Perfum., Cosmet.*, 1958, **31**, 353.
2. British Standards Institution, *B.S.* 2999/1-15, 1958, p. 34.
3. F. H. L. van Os and C. Scholtens, *Parfum, Cosmet. Savons*, 1958, **13**, 14.
4. L. Fibranz, M. I. Blake and C. E. Miller, *J. Amer. Pharm. Assoc., Sci. Ed.*, 1958, **47**, 133.
5. C. B. Stuffins, *Soap, Perfum., Cosmet.*, 1958, **31**, 369.
6. J. Jerkovits, *Fette, Seif., Anstrichmitt.*, 1958, **60**, 44.
7. E. W. Blank, *Soap, N.Y.*, 1958, **34**, 41.
8. P. E. Pilet, *Rev. Gén. Bot.*, 1957, **64**, 106.
9. H. L. Pease, *J. Assoc. Offic. Agric. Chem.*, 1957, **40**, 1113.
10. L. C. Mitchell, *ibid.*, 1034.
11. I. Hornstein, *J. Agric. Food Chem.*, 1958, **6**, 32.
12. A. Rieche and L. Redinger, *Chem. Tech., Berlin*, 1958, **10**, 41.
13. D. R. Pye, *J. Soc. Cosmet. Chem.*, 1958, **9**, 62.
14. E. Krejzová, V. Simon and J. Zýka, *Českosl. Farm.*, 1958, **7**, 82.
15. D. T. Englis, G. Meerman, and L. A. Wollermann, *J. Assoc. Offic. Agric. Chem.*, 1958, **41**, 203.
16. H. Struck, *Naturwissenschaften*, 1958, **45**, 41.
17. I. Gyenes and B. Stefko, *Magyar Kem. Fdy.*, 1958, **64**, 16.
18. S. C. Slack and W. J. Mader, *J. Amer. Pharm. Assoc., Sci. Ed.*, 1957, **46**, 742.
19. T. Sakaguchi, K. Taguchi, and A. Susuki, *Japan-Analyst*, 1957, **6**, 782.

(Continued on page 116)

PLANT AND EQUIPMENT

▶DRUM OPENING TOOL

A drum opening tool available from Powell and Co. is designed to remove heads from steel drums easily and quickly. A safety feature is that a clean cut without ragged edges is made close to the inside edge of the drum. The special cutter blade is drop forged and heat treated and is detachable for sharpening or replacement.

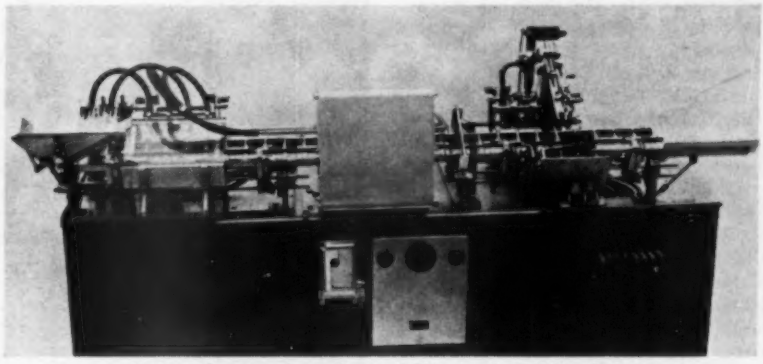
▶AUTOMATIC AMPOULE WASHING AND FILLING

A unit for washing, filling and draw sealing ampoules has been introduced by A. J. Manning Ltd. Known as the *Model* 61, it has been developed for 4-needle washing, drying, cooling, inert gassing, filling and draw sealing ampoules of capacity from 1 ml. to 10 ml. at speeds up to 2,000 ampoules/hr.

The machine, which is of the hopper loading and carrier bar type, can be run by a single skilled operator. In operation the ampoules are subjected to a 4-needle wash (2 liquid, 2 air), when it is claimed practically all water is removed from the ampoules by the last air jet. They are then progressively passed through an electrically heated tunnel type drying muffle, on emerging from which they are cooled by an external air jet. The hot air inside the ampoules is then changed or replaced by an inert gas, and from this station they are passed through the normal liquid filling and draw sealing stations to complete the ampoules ready for sterilising. If preferred, the ampoules can be dried by direct gas heating at a temperature up to 400°C.

The measuring pumps of stainless steel (or alternatively glass) are said to be quickly removable for sterilising. A six-figure counter is included as standard equipment. A single phase electricity supply is required to operate the motor and muffle, and fuel gas and oxygen or compressed air is required for the sealing burners. Compressed air at approximately 30 lb. p.s.i. pressure is also required for washing the ampoules.

The filler is 6 ft. long × 2 ft. wide × 4 ft. 3 in. high.



Automatic ampoule washer and filler by A. J. Manning.

▶LARGE CAPACITY MIXER

Manesty Machines Ltd. have designed a large mixer for dry or moist masses with a capacity of about 200 lb. This machine, to be known as the Manesty model "200" stainless steel mixer, retains all the good features of the small model "H," with several additions such as stainless steel-cased seals on paddle drive shafts, and retractable mounting sleeves on paddle shaft to facilitate removal of the paddle for cleaning.

The first machine has been built and is now undergoing extensive tests. A preliminary specification of the new model is available from Manesty.

▶PLATE HEAT EXCHANGERS

The *Paraflow* plate heat exchanger made by the A.P.V. Co. Ltd. consists of independent stainless steel plates suspended on a rail and clamped between a head and follower. The plates are spaced and sealed at their outer edges by natural or synthetic rubber gaskets affixed to the plates.

The gaskets are so arranged around the ports that each liquid is directed into alternate plate spacings, the liquids generally flowing in counter-current. A pocket at atmospheric pressure prevents mixing of the liquids in the event of leakage past a gasket. The liquids flow in thin films over the plates owing to the narrow spacings. The plates have corrugated troughs which increase the heat transfer area, and these troughs interlock to create variable spacing and so cause a high degree of turbulence.

The plates are grouped to operate in parallel and so provide a "pass" sufficient for the required rate of flow. The "passes" are arranged in series by the provision of blanked ports at the end of each pass.

The ports are brought out to suitable connections in the head and follower and also, in the case of multi-duty machines, to an intermediate header known as a connector plate.

The heat exchangers are made in a range of standard frames utilising four sizes of stainless steel plates. With these standard components, it is claimed, heat exchangers can be made up to meet almost any requirement and for capacities up to about 40,000 g.p.h.

Frames for industrial applications are of mild steel painted with a chemical resistant paint. There are floor and wall mounted types. For hygienic purposes frames are in polished stainless steel. Alternative port connections include B.S.P., Flange, R.J.T., APV "S.P." or American 3A.

The plates can be made in special stainless steels to cope with difficult corrosive conditions and the gaskets can be provided in natural or synthetic rubbers to suit the liquids processed.

▶LABORATORY *p*H METERS

Two new *p*H meters are available from Electronic Instruments Ltd. These are the Vibron direct-reading *p*H meter which is said to provide full-scale readings of 1-4 *p*H units

with a discrimination of 0·005 *p*H on a precision E.I.L. meter. It is stated that the zero drift of the instrument does not exceed 0·002 *p*H units in 12 hr. The other new meter is the E.I.L. blood *p*H meter, claimed to be the first instrument specifically designed for the direct measurement of *p*H in blood. The meter covers from 6·6 to 8*p*H units, which includes the extreme limits of blood *p*H, and is intended for clinical and hospital use.

▶MELTING OUT FATS IN DRUMS

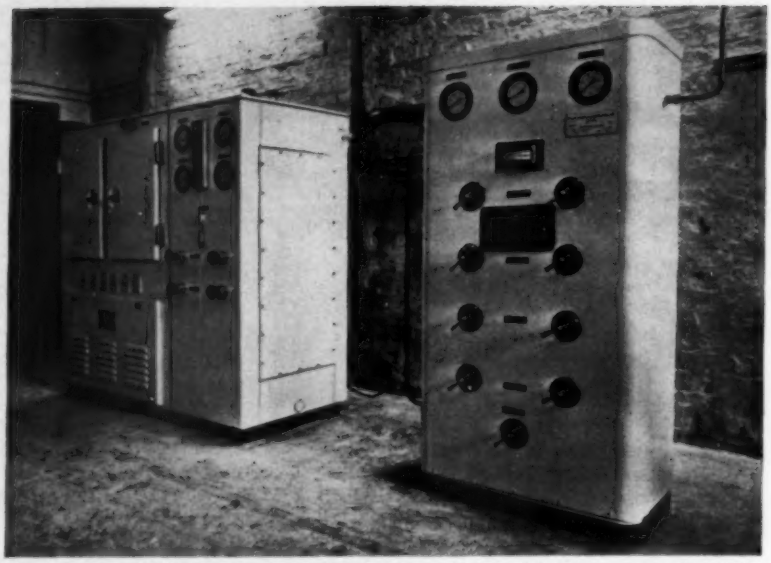
The problem of melting out solid fats from drums before processing is encountered in a number of industries, among them the lanolin manufacturing industry in which the raw material, wool grease, is particularly difficult to extract from the drums. The new factory of Croda Belge S.A. at Verviers, Belgium, uses a novel melting-out plant.

There are two main parts, the first being a heating chamber consisting of an aluminium box, with two infra-red heating elements on each of the six sides facing inwards, and an open bottom. This is mounted above a steel bath heated by a hot-water jacket, the jacket being fed with waste hot water from various processing units in the main plant.

The operation can be done by one man and involves first removing the head of the drum of wool grease and inverting the drum under the drum lifting device. The drum is then lifted and moved by a small crane into the heating chamber. The doors automatically close on the drum and the 12 infra-red elements focus on it.

After about 4 min. the outer surface of the wool grease has melted sufficiently to enable the bulk to slip gently from the drum into the bath. The operation is repeated until the complete batch of wool grease, say 12 drums, has been emptied into the bath and completely melted, when it is pumped away to the main processing plant.

This system has proved very effective for melting-out and obviates all former problems except when the grease comes packed in drums without removable heads, *i.e.* lubricating oil-type drums. The only solution seems to be to cut off the head completely, which is quick but expensive.



The L.N. 10 liquid nitrogen plant showing from right to left: the regenerative H.P. drier unit, the separation unit with Dewar filling and cold cabinets and Freon compressor below.

▶SMALL NITROGEN PLANTS

A range of small, compact, self-contained plants for the supply of liquid or gaseous nitrogen has been developed by Refinery Equipment and Speciality Co. Ltd. to the design of H. E. Charlton Engineers Ltd. Five models are available which between them cover capacities from 1·5 to 24 litres of liquid nitrogen per hr. or 2 to 30 standard cu. m. (70 to 1,000 s. cu. ft.) of gaseous nitrogen per hr.

The plants are designed to produce nitrogen of up to 99·9% purity by the liquefaction and fractional distillation of air. By virtue of their sizes, weights and capacities they are said to be particularly suitable for use in tropical and isolated areas where supplies of nitrogen are not readily available from other sources. Applications include the provision of liquid nitrogen for petroleum gas analysis on oilfield sites and liquid or gaseous nitrogen for general laboratory, refinery and chemical works usage.

The nitrogen plants comprise four principal sections which carry out the following functions: compression of the incoming air; removal of carbon dioxide; drying; and condensing and subsequent separation of nitrogen by fractional distillation.

The use of regenerative driers, a caustic soda scrubber, and cross counter current heat exchangers, is claimed to ensure trouble-free runs. The drying and separation sections are each housed in stove-enamelled cabinets. Foundations are required for the high pressure multi-stage compressor and caustic soda scrubbing tower, but these units can be housed in positions remote from the other two. The plants are fully instrumented, completely wired up electrically and only require interconnecting pipework and electricity supply cables to be installed by the user.

▶COUNTING DAYLIGHT

Photoelectronics (M.O.M.) Ltd. manufacture a daylight integrating meter designed to translate varying daylight into units which are stored on a counting meter. This is claimed to make it possible to expose materials to daylight over any time period and to know exactly the amount of light which has fallen on them irrespective of varying weather conditions.

The unit comprises a photocell and a transistor integrating amplifier which drives a low inertia integrating counting meter. When maximum daylight falls on the photocell the meter records a maximum count of one division in 55 sec. with the rate of count being directly proportional to the varying daylight conditions. The total count before automatic re-set is 10,000. The photocell is housed in a 2½ in. dia. cast aluminium case of weatherproof construction.

CORRESPONDENCE

Fluoroacetamide *v.* Bean Aphid

To The Editor.

Sir: On p. 76 of Manufacturing Chemist for February 1959 it is reported that bean aphid may be controlled by demeton methyl and reference is made to the Rothamsted Annual Report for 1958, p. 148 (Way and Banks). If the original is consulted it will be seen that other systemic insecticides were tested by these field workers, who reported success not only with demeton methyl but with fluoroacetamide, a new British systemic insecticide.

M. A. Phillips,
Chief Chemist,
Associated Fumigators Ltd.
London, E. 16.

Cosmetic Congress Programme

To The Editor.

Sir: On behalf of the Society of Cosmetic Chemists of Great Britain, I am writing to thank you for the publicity which you have given us in relation to the forthcoming Congress of Cosmetic Science.

I would, however, like to make one or two points *a propos* the observations which you have been kind enough to make on p. 2 of the January issue of your well-known journal.

Of course, in our industry, but not more than in any other, there are hundreds of subjects which could quite well, and with advantage, be discussed at a Congress. For example, it is well known that the biggest expenditure in the production of cosmetic and toilet preparations is packaging, and it would have been quite easy to have organised a symposium lasting for many days dealing solely with this subject. Obviously a choice had to be made and the Council of the Society decided that they would try and cover analysis of raw materials, assessment of quality and finished products, certain important and vital aspects of manufacturing, and the biological assessment of the finished products. Hence, one-quarter of the whole time allotted is occupied by one or other of these four subjects.

There is one important point which could be overlooked, namely that formulation *per se* is of little value: it tells little or nothing of how to make the finished product. Only by having good quality control of raw materials (Part I of the Congress), by having the means to assess the value of the finished products (Part II of the Congress), by understanding the technique of producing multiphase mixtures which have the right appeal to the user and the correct rheological properties (Part III), and, finally, by knowing that the cosmetic products are fulfilling a desirable and necessary purpose (Part IV), can satisfactory cosmetical products be marketed.

It would seem to be generally accepted that the programme which you have published in your January issue seems to cater for some, but certainly not all, of the needs of the individual cosmetic chemists.

R. H. Marriott, D.Sc., F.R.I.C.
Hon. Organiser of Congress.
Stanmore.

Writing an article or a book?

The Editor invites articles on subjects of technical and engineering interest in the field of pharmaceuticals, fine chemicals, cosmetics, toilet preparations, perfumery, soap, detergents, agricultural and pest control chemicals and all other subjects covered by **Manufacturing Chemist**. Articles should be written in the language which working chemists can understand and should be factual and practical. Intending contributors should first send the Editor a synopsis. Articles should be typed in double spacing with wide margins and on one side of the paper only. They should be accompanied by photographs, diagrams, flow-sheets, graphs or drawings. All should bear the name and address of the Author.

The Leonard Hill Technical Group, publishers of **Manufacturing Chemist**, also invite the submission of technical and scientific manuscripts of books for consideration. Leonard Hill are well known for successful promotion of their books by vigorous advertising in their own journals and other media. This is supported by a world-wide selling and distributing organisation. MS, prepared in the same way as articles, should be sent to:

The Manager,
Leonard Hill (Books) Ltd.,
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London, N.W. 1.

Other Men's Minds

To The Editor.

Sir: Your contributor Cicerone writes (Feb., p. 86), "The scientist who lets a librarian read for him is also letting him think for him." To me as an information officer this remark shows your contributor to be out of touch with the needs and difficulties of industrial scientists in getting through literature, as does his implied comparison with Charles Lamb, who certainly was full of care, but who had time to stand and stare (and read) on a scale the industrial scientist can only envy bitterly.

Librarians and information officers vary in technical qualifications and knowledge from the complete layman to the man fully equal to his colleagues on the plant or at the bench, and with linguistic knowledge they may not collectively possess. Naturally they come to rely heavily on his assessment of new information.

Methods of communicating information range from the simple "Have you seen this? It may interest you," to special abstract bulletins written with the firm's interests in mind, and expert reviews of recent developments. The system has grown up in the larger firms, as most things do in industry, to save time, which is money. Without these aids most industrial scientists could not or would not get through the literature to anything like the same extent. It has never been suggested that they should rely on these aids entirely.

Cicerone is thus a little sweeping in his judgment of widely differing information services, and his alternative, that people should "get their reading organised," helpful though it may be, is no substitute.

D. J. Campbell,
M.A., PH.D., A.R.I.C., A.L.A.
Ealing.

Cicerone writes:

My criticism was not of the aids mentioned by Dr. Campbell but of the scientist who makes them an excuse for not doing his proper stint of reading.

BOOK REVIEWS

The B.D.H. Book of Organic Reagents

Prepared and published by the British Drug Houses Ltd. 10th Edn. Pp. 175, index. 18s. net.

ALTHOUGH this is the tenth edition of the well-known handbook, little remains of previous editions except the title. Seventy-one reagents were described in the last edition, published twelve years ago, but only 48 in the present book. This is due to the weeding out of reagents subsequently found unsatisfactory and to the wish not to duplicate information in the "B.D.H. Spot Test Outfit Handbook" which has led to the omission of most of the qualitative reagents.

Each monograph gives a brief description of the reagent and its general uses, qualitative tests (if any) and quantitative tests. Emphasis is on quantitative tests.

While the authors have kept up with the times in giving many absorptiometric and instrumental colorimetric methods, they have not forgotten that many laboratories are not equipped for spectrophotometry and still rely on comparison with standards as providing the simplest and most satisfactory procedure.

This authoritative handbook needs no recommendation to analysts. Those who only occasionally carry out analyses will also find it invaluable. Finally, a word of praise for the designer of the jacket of this book; the multicoloured chameleon is really most apt.

A Dictionary of Named Effects

and Laws in Chemistry, Physics and Mathematics. By D. W. G. Ballentyne and L. E. Q. Walker. Chapman and Hall, London. 1958. *Pp.* 205. *30s. net.*

THE scope of this book is wider than the title suggests. It lists and briefly explains laws, rules, theories, processes, reactions, tests, units, scales and other phenomena and concepts known by personal names. Few omissions were noted, and those marginal. More care might have been taken to ensure consistency over personal names. "Schrödinger" has his umlaut but "Eotvos" has lost both his, and "Boettger" is different again. Russian names are not consistently transliterated, but given indifferently in English, German and mongrel forms. These shortcomings can hinder the finding of information in the book. More references (*e.g.* from Kishner—Wolf to Wolf—Kishner) and initials and dates of each person would be useful. This is a most useful work.

D.J.C.

Bookshop Service

All books reviewed in MANUFACTURING CHEMIST and all other scientific or technical books may be obtained from:

Technical Books,
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London, N.W.1.
Telephone: Euston 5911.

Prompt attention is given to all orders.

Pasteur Fermentation Centennial

A Symposium. Published by Chas. Pfizer and Co. Inc., New York. Pp. 207.

THIS book is the record of a symposium sponsored by Chas. Pfizer and Co. Inc., in 1957, to commemorate the centenary of the publication of Louis Pasteur's *Memoire sur la fermentation appelée lactique.* A number of leading experts in antibiotics and biochemistry presented papers on such subjects as cellular and biochemical interplay between host and parasite, new developments and prospects in fermentation chemicals, and trends in antibiotic research. These papers were sandwiched between a number of well-composed tributes to Pasteur, including one from his grandson, Prof. L. Pasteur Vallery-Radot. British participants in the symposium were J. J. H. Hastings of the Distillers Co., and Dr. D. Rowley of the Wright-Fleming Institute. Others came from France, Japan, Russia and, of course, the U.S., thus making the meeting a truly international tribute to Pasteur. The Russian participant, incidentally, was G. F. Gause who has created much interest by using staphylococci with impaired oxidation as test organisms for antibiotics; his contribution was on the general subject of antibiotic screening.

The book is worthily edited and produced.

Schimmel Briefs

Vol II. Schimmel, New York. 73*s.* 3d. *net.*

THE Schimmel Briefs are monthly reports on topics of interest to the cosmetics, soap, perfumery and toilet preparations industries. Here, presented conveniently in book form, are Briefs Nos. 190 to 261 issued between January 1951 and December 1956. A 9-page index gives easy access to the multitude of subjects discussed during those six years.

One of the first briefs to be published during this period, as far back as June 1951, dealt with the awakening public interest in aerosols, an indication of Schimmel's reputation as forecasters of consumer trends.

The Pentaerythritols

By Berlow, Barth and Snow. ACS Monograph 136. *Reinhold and Chapman and Hall. Pp.* 317. *80s. net.*

ALTHOUGH it was first discovered in 1882, it was not until the early 1930's that manufacture of pentaerythritol began on a large scale. Since that time the uses of this interesting compound have continued to increase mainly in the paint industry but also in fine chemicals and organic synthesis. Information relating to the methods of preparation, physical and physiological properties, reactions with various chemicals, derivatives and uses is now available in this book.

Great care has been taken in assembling a multitude of facts with impartiality; whatever the views of the authors may be, they do not obtrude. There are many pages showing structural formulæ of the derivatives mentioned, although in some cases they are not in a system which is generally known.

NOTES AND NOTIONS

MIX-UP

MIXING is perhaps the commonest of pharmaceutical operations and there are machines for every conceivable purpose. Going around a factory recently I heard complaints not about mixing efficiency, which might be expected, but about mechanical faults which I would have thought would long ago have been eliminated. Pointing to a newish looking paddle mixer my host (the manager) said it did a perfectly good job except for one thing: it leaked grease into the mix —not much, but enough to disperse into a thousand particles that eventually showed up as spots on the tablets.

A workmanlike looking rotary mixer was also praised for the excellent job it did. "But why on earth didn't the designers consider the poor chap who's got to load it? He's got to lift the ingredients 4 feet or so." Thus, my host. I mentioned a movable platform but was told it was not very practical because, since the whole mixer rotated, it was necessary to put a substantial cage around it. Another curious thing: though safety devices are built into mixers with internal agitators to prevent accidental ingress, apparently there are no rules against using a rotating mixer uncaged. Of course any decent firm naturally puts it into a cage immediately and adds a trip device to prevent it being used when the cage is open. But there are factories in this world with less refined ideas. Odd.

WHO'S LAUGHING?

THE PUBLIC'S estimation of scientists cannot have been improved by the diamond hoax put over by the Professor of Geology at Reading University and some students. If a presumed expert like Professor Allen chooses to appear on TV and solemnly testify that real diamonds —worth hundreds of pounds—had been found in England for the first time, naturally people will believe him. University professors are assumed to be truthful and reliable people. Surely the essence of a good hoax is that the wildly improbable is made plausible. If a student had managed to pass himself off as a Professor of Geology and spoofed Cartiers into believing the sapphires were diamonds, that might have been a good hoax.

There seems nothing especially clever in a Professor using his title and prestige to spoof a few reporters, particularly when the excuse he gives is that Cambridge and Oxford get all the publicity and modern universities like Reading are ignored. If unfunny hoaxes are the only excuses they can find for publicising themselves then places like the Geology Department at Reading deserve obscurity.

COAL CANUTES

NOW THERE'S a surplus of coal the Miners' Union wants everyone to stop using oil, conveniently forgetting the past failures of the mines which drove many firms into oil, to say nothing of the constant increases in coal prices which have now made oil competitive. Of course the Press was quick to remind all and sundry that the Miners' Union's new Headquarters building in the Euston Road, London, was to be oil-fired, whereupon the money-no-object Union chiefs decreed that the oil boilers were to be converted to coal. They protested that when the building was designed they had been assured by the highest experts that coal would be short for years.

The miners' decision to throw out their oil burners may be good union politics but it will not sell more coal. The only positive response it has inspired is a request from the Medical Officer of Health for St. Pancras that smokeless fuel should be used. The headquarters are in an area it is hoped to make a smokeless zone. Since the MANUFACTURING CHEMIST office is within 200 yards of the new union building, I have a personal interest in the matter. This particular area of London, being near the main railways stations, is not exactly famous for clean air and I have every sympathy with the Council's desire to reduce pollution. Our building, incidentally, is gas heated.

The miners' gesture is as futile as Canute's attempt to stem the tide. Opposite their new building is the headquarters of one of the biggest engineering firms in the country. Their main job now is designing boilers and other plant for nuclear power stations. In 25 years' time we may be enjoying smokeless cities, lighted, heated and powered by nuclear energy. Of course we shall still need coal; not to burn but to transform into chemicals, plastics, fibres, high-grade liquid fuels and a thousand other products. The ultimate future of coal is surely to provide raw material for the chemical industry. The Miners' Union should scrap their Luddite ideas and look to the real future of their industry.

THE SMOKIEST PLACE ON EARTH

HIGHLY relevant to the miners' demand (in their fuel policy statement) that coal should continue to be the nation's main source of energy are the findings of Prof. F. C. Pybus, Emeritus Professor of Surgery at the University of Durham. Without prospect of denial, Prof. Pybus declares that Britain is the smokiest country on earth. Each year we burn 180 million tons of coal which forms 2·5 million tons of smoke. And here is the significance of this calculation: in this smoke is no less than 750 tons of benzpyrene at a concentration of 300 p.p.m. Benzpyrene, it will be recalled, is the stuff alleged to make tobacco smoking carcinogenic. And how much benzpyrene is formed in tobacco smoke? Prof. Pybus estimates that the 111,607 tons of tobacco we smoke each year forms 18,000 tons of smoke in which there is a total of 8 lb. of benzpyrene. The concentration is 0·2 p.p.m.

If benzpyrene causes cancer it is overwhelmingly evident that coal is more hazardous than tobacco. As Prof. Pybus comments, with coal producing 1·5 gram of benzpyrene per person each year, it is a wonder that so few get cancer.

While Prof. Pybus's findings, published in the *Medical Press*, by no means exonerate tobacco, they do put the cancer problem in perspective.

Cicerone

NEWS . . .

Corrosion Exhibition promises to be best yet

At a press reception held at Leonard Hill House, London on February 23, it was announced that the 1959 Corrosion Exhibition will be 50% bigger than the 1957 exhibition. Nearly 80 firms are showing a wide range of materials, processes and services for the defeat of corrosion. All the best known firms in the anti-corrosion industry are exhibiting and the show promises to be the best of its kind ever held. The National Chemical Laboratory will be exhibiting; it will feature the work of its Corrosion of Metals Group. Among research advances to be shown will be a means of estimating the corrosiveness of water.

Among the guests at the reception was Sir Owen Wansbrough-Jones, K.B.E., C.B., Chief Scientist of the Ministry of Supply. Sir Owen will officially open the Exhibition at 11.30 a.m. on Monday, April 27. It will continue until Thursday, April 30. The venue is the Royal Horticultural Society's New Hall, Greycoat Street, Westminster, S.W.1.

Write to the Exhibition Organiser, *Corrosion Technology*, Leonard Hill House, Eden Street, London, N.W.1, for complimentary admission tickets.

Chemical inventions earn revenue for NRDC

Research to develop an ultrasonic flowmeter for metering fluids in chemical and pharmaceutical processing is being sponsored by the National Research Development Corporation. The work is being done at the British Scientific Instrument Research Association with the help of a substantial money grant from the N.R.D.C. The project is one started under the " development contract " powers given to the Corporation by Parliament in 1954.

Among other projects under development is an acetylene synthesis process, an electrodialysis cell, and the synthesis of new strains of micro-organisms.

In its latest report the Corporation estimates its revenue from licensed inventions at £174,242 in 1957-58, an increase on previous years. Goods worth many millions of pounds annually are being made with Corporation inventions, it is claimed. Chemical inventions which are earning money include Prof. Wain's weed-killers, tri-iodothyronine, anti-thyroid compounds, hecogenin from sisal, nisin, pesticidal coating compositions and anti-tumour agents of the nitrogen mustard type.

Nobel Laureate directs new instrument company

Griffin and George (Research and Development) Ltd., has been formed by the Griffin and George Group to conduct research into, and the development of, new and improved scientific instruments and apparatus for laboratory use and process control.

The research director is Dr. A. J. P. Martin, F.R.S., whose work on partition chromatography, earned him in 1952 the Nobel Prize for chemistry (jointly with Dr. R. Synge).

New laboratories to house the research and development staff will be designed and equipped. A major part of the company's effort will be directed towards a review of modern analytical techniques and the development of the instruments and apparatus for applying them in the laboratory and on the plant.

French fertiliser process for U.K.

The French chemical firm, Potasse et Engrais Chimiques, have given an exclusive licence for their complex fertiliser processes, covering the United Kingdom and Eire, to Humphreys and Glasgow Ltd., of London.

In the French processes, phosphate rock is acidulated with nitric acid. The resulting slurry is then neutralised with ammonia, with precipitation of dicalcium phosphate. The remaining calcium nitrate is converted to an insoluble calcium salt, thus eliminating filtration.

The calcium nitrate conversion is carried out by the use of one of the following:

(1) SO_4 ion (in the form of sulphuric acid or ammonium sulphate or potassium sulphate)
(2) PO_4 ion (*e.g.* in the form of phosphoric acid) and
(3) CO_2 ion (in the form of carbon dioxide in the presence of a stabiliser).

The most economical process is that using the CO_2 ion, because apart from the raw materials supplying the fertilising elements (phosphate rock, nitric acid, ammonia, and eventually a potassium salt), only ordinary carbon dioxide and a small amount of magnesium salt are required.

Evans Medical staff leave Burma

At the request of the new Government of the Union of Burma, key staff of Evans Medical Supplies Ltd. employed by the Burma Pharmaceutical Industry have been withdrawn. It was stated in the request that in the Government's opinion the Burmese senior staff had been adequately trained and that the enterprise was fully and satisfactorily operational.

The Association of Consulting Scientists

The Association of Consulting Scientists has been formed with the main purpose of acting as a clearing bureau for inquiries for independent scientific services. Membership embraces independent whole-time consulting scientists in the United Kingdom in all fields of science and technology other than medicine and civil, mechanical and electrical engineering. The founding members are mostly chemists and biologists, but physics and other sciences are expected to have representation in the Association before long.

The new Association will operate in close collaboration with the Royal Institute of Chemistry, and other professional institutes, and with other organisations concerned with the co-ordination of British efforts in research, production and marketing.

The following officers have been elected: J. G. Davis, PH.D., D.SC., F.R.I.C., M.I.BIOL., chairman; G. W. Ferguson, B.SC., PH.D., F.R.I.C., hon. treasurer; W. H. Stevens, A.R.C.SC., F.R.I.C., F.P.I., F.I.R.I., hon. secretary.

Communications or inquiries regarding the Association should be addressed to the Hon. Secretary at 15 Hawthorne Road, Bromley, Kent.

British industrial glass for the U.S.

Q.V.F. Ltd. have appointed the Corning Glassworks, of Corning, New York State, as stockists and distributors for the whole of the U.S.A. They have already shipped to America £10,000 worth of Q.V.F. industrial glassware.

A. F. H. Devers and Co. (Pty.) Ltd., of Selby, Johannesburg, have been appointed Q.V.F. distributors in South Africa.

The Sharpe Construction Co. Ltd., of Montego Bay, Jamaica, have been appointed temporary agents and distributors in the British West Indies. For the Belgian Congo, Q.V.F. have appointed Armand Dutry and Co. Ltd. also on a temporary basis.

Use of demeton-methyl

The Ministry of Agriculture has issued recommendations for the safe usage of demeton-methyl in agriculture and horticulture. These cover protection of operators, consumers, crops and livestock, and storage and disposal of used containers.

Cancer "cure" denial

Rumours that I.C.I. have found a cure for cancer, which were circulating in London's financial circles at the beginning of the month, brought a prompt denial from the company. The statement said that the pharmaceutical division of I.C.I. had been engaged in cancer research for over 20 years and would continue to do so. Although from time to time possible leads had emerged, these had not, so far, provided any positive results. The company regretted reports that a successful outcome was imminent, in view of the false hopes they might have raised.

Finally I.C.I. stated that while it attached great importances to its pharmaceutical interests they were a relatively small part of its total business and even if a cancer cure were discovered it would not significantly affect the company's commercial and financial position.

Mr. E. G. Wertheimer, managing director of Universal Metal Products Ltd. (seated in front of the toastmaster), and Mr. H. Brickhill, deputy chairman (extreme left), with members of their staff at the annual works party, when gold watches were presented to employees with 25 years' service. The company, a wholly-owned subsidiary of the Winterbottom Book Cloth Co., celebrates its Silver Jubilee this year.

Eucalyptus oils

Polybractea eucalyptus oil B.P. is now available from Jacobson Van Den Berg and Co. (U.K.) Ltd., 3-5 Crutched Friars, London, E.C.3. The oil has a cineole content of 80 to 90% and is said to be free from philandrene, water and other foreign matter. Two types are available, a single distilled and a double distilled product. It is expected that 2 to 3 tons per month will be available.

Microchemical course

Commencing April 18, 1959, a course of 12 lectures and appropriate practical work on micro- and semi-microchemical methods will be held on Saturday mornings at the Norwood Technical College, London, S.E.27, from 9.15 a.m. to 12.30 p.m.

The course is particularly suitable for industrial and research chemists and teachers. Application forms for admittance to the course may be obtained from the Secretary of the College. The London fee for the course is £1.

Large spray dryer for Russia

The Kestner Evaporator and Engineering Co. Ltd. have obtained an order from V/O Techmashimport of Moscow to supply a large spray drying plant for sodium sulphate to be delivered to the U.S.S.R. this year. It will be among the largest installations supplied by Kestners, comprising spray drier, electric motors and conveying equipment. It will employ a Kestner centrifugal atomisation system and be producer gas fired. Capacity will be about 5,000 lb. per hr. of dried sodium sulphate.

Insect spray cheaper

I.C.I. have reduced their 5 oz. aerosol insect spray by 1s. to 4s. 6d. The 12 oz. size has been reduced by 1s. 6d. to 9s. and the 20 oz. size by half-a-crown to 15s.

Agents appointed

Kingley and Keith Ltd., 110-112 Victoria Street, London, S.W.1, have been appointed sole U.K. distributors for Kay-Fries Chemicals Inc., of West Haverstraw, N.Y., U.S.A., manufacturers of organic intermediates.

New Izal laboratory

A new control laboratory has been installed on the first floor of the Izal factory of Newton Chambers and Co.'s chemicals division, near Sheffield, to enable chemists to be close at hand to deal with production problems as they arise. Its main work will be the investigation of paper and paper products, and the quality control of adhesives and disinfectant fluids.

Newton Chambers' first laboratory was set up in 1885; today there are a number of laboratories in charge of Mr. E. J. Miles, chief chemist of the chemicals division.

Distributors for German chemicals

Charles H. Windschuegel Ltd., 1 Leadenhall Street, London, E.C.3. have been appointed distributors for products of Chemische Fabrik Stockhausen et Cie., of Krefeld. Products available include chemicals for the fur and leather trades, paper industry, and anti-foaming agents.

Franco-British pharmaceutical congress

The Franco-British Pharmaceutical Commission will hold a Congress at Peebles during the weekend May 8-11. Last year, with plans far advanced and bookings made by 160 British and French, the French political crisis brought about a cancellation. The Congress will follow the customary lines, including an all-day excursion on the Sunday. The cost will be £12 12s. per person inclusive from Friday's tea to Monday's breakfast. Application forms may be obtained from the Hon. Local Secretary, 36 York Place, Edinburgh 1, or from the Secretary, Franco-British Pharmaceutical Commission, 17 Bloomsbury Square, London, W.C.1.

Cheaper steam traps

Spirax-Sarco Ltd. are reducing the prices of certain steam traps. The ½ in. Spirax Thermodynamic Trap (TD) has been reduced in price by 15%, from £6 15s. to £5 15s. The Spirax 1 in. FT.600 float-thermostatic trap, in malleable iron, has been cut from £7 13s. to £7 2s. 6d.

Towards the end of March the firm will be introducing a ¾ in. Spirax TD trap (complete with integral strainer as is the ½ in. trap) which will sell at £7 5s.

Change of address

McKesson and Robbins Ltd. have moved to larger premises at Hambro House, Queen Street Place, London, E.C.4; telephone City 5944.

Shell's new plastics plant

Shell Chemical Co. Ltd. are building a large polyolefin plant at the Petrochemicals Ltd. works at Carrington, near Manchester.

The first stage will be the production of some 30,000 tons p.a. of polyethylenes and polypropylenes, including high-density polyethylenes, which will be manufactured under the exclusive Ziegler licence for the U.K. which was acquired by Petrochemicals Ltd.

Control instruments demonstrated

Demonstrations of Beckman process control instruments were given recently in London by A. Gallenkamp and Co. Ltd.

Of chief interest was the industrial gas chromatograph for monitoring four components in up to 10 streams on plant. In the demonstration commercial propane was analysed, using a double column and hydrogen as the carrier gas. Visitors remarked on the steadiness of the zero line and the high reproducibility of peak height.

Also on show were an electrolytic hygrometer for monitoring stream humidity up to 1,000 p.p.m., a dissolved oxygen analyser with a sensitivity of 25 parts per thousand million for boiler water feed, a portable paramagnetic oxygen analyser and a laboratory gas chromatograph.

Scottish co-operatives' new chemists' shops

The Scottish co-operative movement, which already has a substantial manufacturing side in pharmacy, is now developing its retail outlets. A number of modern shops are already in operation, including one by the Leith Provident Co-operative Society, another by the Dunfermline Society at Abbey View.

Plans have now been announced for the following: Falkirk United Co-operative Society Ltd. have plans on hand for three new drug branches, one of which will be in the town centre with an area of 1,800 sq. ft. In addition to pharmacy and toiletry service it will cover surgical and photographic services. Bathgate Co-operative Society is to refit its drug department as part of a major scheme. Clydebank Co-operative Society Ltd. will carry out a programme which will include new chemists' shops, and Dunfermline Co-operative are to make improvements in their central premises on the lines already carried out at Abbey View. In addition to these, Paisley Co-operative Manufacturing Society is to overhaul several of its shops and add a new chemist shop in the coming year. Other co-operatives have similar plans on hand, indicating that 1959 will see a substantial increase in the number of specialised retail selling points operated by the movement in Scotland, with increased competition for established pharmacies.

Technical Press Review — March

Chemical and Process Engineering.—Variable-area Flowmeters; New Trends in Flow Measurement and Control; Centrifuging; Uranium Factory at Springfields.

Corrosion Technology.—Elastomers Solve Corrosion Problem; Neoprene and Hypalon Linings for Large and Small Pipes; Protective Coatings and Linings in Neoprene; Sheet Neoprene Linings for Chemical Plant; Spray and Brush Applied Neoprene Coatings.

Automation Progress.—Electronic Process Control—Scope and Advancement; Technological Progress in the Glass Industry; Leadscrew-dependent Co-ordinate Setting; Automatic Co-ordinating Setting with Multi - spindle Selection; Capacitance Pick-up Inspection Machines; Automatic Machine Tools in East Germany; Cost Accounting in Automation.

Petroleum.—Gas Liquid Chromatography; Royal Dutch Shell at Home; Oilfield Development; Skin Protection Against Petroleum; Safety in the Refinery; Medical Services in the Oil Industry; Utilisation of Residual Fuel Oil.

Atomic World. — Manufacturing Fuel Elements from Uranium Ores; Ore Production at the New Mary Kathleen Mine; Uranium Production at Springfields.

Paint Manufacture. — Preview of O.C.C.A. Exhibition; How Paints Stand Up to Tropical Climates; Instrumental Control of Temperature.

Food Manufacture.—Pure Fruit Juices; Soft Drinks Equipment; The Problem of Improving Nutritive Value—7; Annual Reviews: The Baking Industry.

Dairy Engineering. — Boiler House Maintenance for Economical Performance; Electropolishing—A New Method for Cleaning Stainless Steel Vessels; Responsibilities of the Transport Manager; Aluminium Milk Cans—2 & 3; Instrumental Control and Automation in the Dairy Industry—2.

World Crops.—Grain Handling Equipment; Grain in International Trade; Farm Grain Stores; Maize in Roumania.

For specimen copies and subscription forms apply to the Circulation Manager, Leonard Hill House, Eden Street, London, N.W.1.

Change of name

Economic Utilities Ltd. and Robert Pintus and Co. Ltd., both of Royal London House, Finsbury Square, E.C.2, have amalgamated and are now trading as Briess, Pintus and Co. Ltd.

Packaging machinery agreement

Baker Perkins Ltd., of Peterborough, and The Forgrove Machinery Co. Ltd., of Leeds, have formed an association with Höfliger and Karg, of Stuttgart, to sell the latter's packaging machinery in the U.K.

Baker Perkins will sell Höfliger and Karg's equipment to the British food industry.

Forgrove will sell Höfliger and Karg's filling and packaging equipment to the pharmaceutical industry. There are machines for liquids which will fill, dry, sterilise, seal, insert, sort, feed, stopper, spin, screw, carton and pack. For powders and pills, there are machines to sieve, dose, dry, sterilise, vibrate, fill, insert, screw on, spin, close, carton and pack.

Aerosols display

Sixteen leading companies in the aerosol packaging field are putting on an educational display at the Packaging Centre from March 16 to April 8. It is planned to give a complete, clear picture of what makes an aerosol or pressurised pack. The exhibition will be open on weekdays from 10 a.m. to 6 p.m., and admission is free.

The Packaging Centre is at 50, Poland Street, London, W.1.

Poison in suicide and accident

In 15 countries covered by a statistical report of the World Health Organisation (WHO), about half of all suicides are by poisoning, with a considerably higher percentage for women than for men. In accidents, poison is a much less frequent cause of death, although it still claims many lives.

Both in accidental and suicidal poisoning, many deaths are accounted for by gas in domestic use and, in some of the countries under review, this is a growing cause of accidental death. Among other killing poisons listed in the report are analgesic and soporific drugs and alcohol.

Company finance

Profits for the year ended October 31, 1958, of **Bowmans Chemicals Ltd.** amount to £14,067 (£16,206). A final dividend of 6% less Income Tax on the Ordinary shares was declared making, with the interim of 4% already paid, a total of 10% for the year.

Net profit of the **Borax (Holdings) Group** for 1958 was £966,075 (£1,881,236).

A second interim dividend of 7% (6%) less tax has been declared on the Ordinary issued shares of the **Beecham Group Ltd.** for the year ending March 31.

Group turnover of the **British Oxygen Co. Ltd.** for the year ended September 30, 1958, rose by 15·7% spread over a wide range of products. Profit for the year was £2,876,208 (£2,440,245).

People

R. C. Chirnside

C. W. Gerberding

H. Smith

At the annual meeting of the British Supporting Group for the World Medical Association held recently at BMA House, **Dr. T. H. Manners Kerfoot** was elected President for 1959 in succession to **Dr. A. Hall,** a former President of the BMA. Dr. Kerfoot is also President of the Association of British Pharmaceutical Industry.

R. A. Withers has been appointed a director of Ilford Ltd. and elected deputy-chairman, subject to his re-election as a director at the annual general meeting. Mr. Withers has also been appointed as joint managing director with **W. H. Dimsdale,** this appointment to have effect from April 1.

R. G. Hoare, M.P.S., a director of the Pharmaceutical Division of Imperial Chemical Industries Ltd., will represent pharmaceutical, chemical and insecticide interests in the United Kingdom Trade and Industrial Mission to Ghana, led by **Sir George Binney.**

T. Stewart, M.R.C.V.S., D.V.S.M., Veterinary Adviser to Bengers Laboratories Ltd., is making a three-week tour of Canada's hog raising areas. He will lecture on baby pig anæmia and the use of *Imposil* in combating the disease. It is claimed that one 2 c.c. injection protects the piglet against anæmia and also improves weight gains and resistance to disease.

Frederick Wolff, M.D., clinical pharmacologist to the Wellcome Foundation Ltd., is taking up an appointment as Assistant Professor of Medicine at Johns Hopkins Hospital, Baltimore, Maryland. He will be working with Doctors M. Harvey and L. Lasagna within the Division of Clinical Pharmacology, and continue studies in diabetes and cardiovascular disorders.

S. W. Cheveley, the chairman of I.C.I.'s Central Agricultural Control, is retiring from the service of Imperial Chemical Industries on March 31. He is succeeded as Chairman of C.A.C. by **R. A. Hamilton,** who retains his appointment as development director of I.C.I. Billingham Division. He was formerly visiting director of the Pharmaceuticals Division.

R. C. Chirnside, F.R.I.C., chief chemist of the Research Laboratories of the General Electric Co. Ltd., Wembley, has been nominated by the Council of the Society for Analytical Chemistry as the next President. Mr. Chirnside, who is 55, has been a member of the Council of the Society on a number of occasions since 1938 and was a Vice-President in 1946-7, 1951-2 and 1957-8. He has also been a member of the Council of the Royal Institute of Chemistry on a number of occasions since 1944 and was a Vice-President from 1956 to 1958. He was appointed to the scientific staff of the G.E.C. Laboratories in 1927, having previously been with J. and H. S. Pattinson, consulting chemists of Newcastle-upon-Tyne.

J. O. Rintoul, managing director of Beecham Foods, has been appointed a vice-chairman of the Beecham Group. **N. F. Fabricius** becomes chairman of Beecham Maclean, and **A. E. V. Houchen** chairman of Beecham Foods and of County Laboratories. Mr. Fabricius has been appointed chairman of Beecham Overseas; **J. D. Smartt,** managing director of Beecham Foods; **E. P. Godden,** managing director of Beecham Overseas; and **R. W. Murphy,** managing director of County Laboratories.

C. W. Gerberding, founder and senior president of Dragoco, Holzminden, Germany, perfume and flavour manufacturers, celebrates his 65th birthday on March 14.

Mr. Gerberding has built up his business over the past 40 years by hard work and constant enterprise. His friends wish him a happy birthday and many more years of activity.

Robert W. Ramsay, a director of the company, has been appointed general manager of Evans Chemicals Ltd., of Elstree, contract packaging specialists. He joined the company as its buyer in 1946. In 1950 he was appointed a director and secretary of Biometica Ltd., an associated company of Evans Chemicals Ltd. In January 1958 he was appointed to the board of the main company.

J. E. C. Bailey, C.B.E., Chairman and Managing Director of Baird and Tatlock (London) Ltd. and Hopkin and Williams Ltd., left the United Kingdom on February 1 for a short tour of Uganda, Kenya, North Rhodesia, South Rhodesia and South Africa. He will visit the companies' branches, agents and representatives in these countries to discuss general matters relating to the export of scientific equipment and chemicals.

While in North Rhodesia, Mr. Bailey will visit a new branch of the companies which has recently been opened at Ndola on the Copper Belt. This branch will handle the increasing volume of orders coming from the area.

H. H. Bagnall has retired from the post of city analyst to Birmingham, a post he held for 30 years.

Sir Thomas Bowen, Bt., has been appointed to the newly created post of marketing executive of the Pyrethrum Board of Kenya, who are implementing plans for increasing sales of the natural insecticide. This appointment follows recommendations made by a firm of business consultants.

Sir Thomas Bowen, who is 37, will have his office at the Board's headquarters in Nakuru, Kenya, and will be travelling to many parts of the world on behalf of the Board.

Harold Smith, M.Sc., A.R.C.S., joint managing director of I.C.I.'s General Chemicals Division for the past two years, has been appointed chairman of that Division. Joining I.C.I. in 1929 he went to the research department of the Dyestuffs Division for ten years and then joined the production department, becoming assistant works manger of the Division's Huddersfield works. In 1950 he was appointed head of the Division's production department, becoming production director in 1952. Later, while holding the post of joint managing director of the Dyestuffs Division, he became a visiting director of I.C.I.'s General Chemicals Division and joint managing director in March 1957. He is also chairman of Plant Protection Ltd.

Benger Laboratories Ltd. have appointed **John Yorwerth** as marketing controller. Mr. Yorwerth joined Benger nearly six years ago as a medical representative. He set up and controlled the public relations department and was then made generally responsible for company publicity. Immediately before his new appointment he served as sales manager.

Bengers have also appointed **Gordon McAlpine** to the new post of field manager. He joined the company as amedical representative in 1956.

Staff appointments

The following promotions and appointments to the staff of the General Chemicals Division of Cyanamid of Great Britain Ltd. have been made: **R. I. H. Baker,** promoted to Sales Supervisor; **A. R. Brown,** promoted to Technical Service Supervisor; **P. F. Taylor** joins the company as a Technical Representative in the Midlands area; and **J. E. Salmon,** has joined the company as a technical representative dealing mainly with paint and allied industries.

Officers elected

At the annual general meeting of the Scottish Section of the Society for Analytical Chemistry held in Glasgow recently, the following were elected officers of the Section for the coming year: Mr. A. N. Harrow, chairman, Mr. A. F. Williams, vice-chairman, and Mr. J. Brooks, hon. secretary and treasurer.

Obituary

Dr. G. M. Bennett, F.R.S., the Government Chemist, died suddenly at his home on February 9, at the age of 66. He was lecturer in organic chemistry at Sheffield University from 1924-31 and Firth Professor of Chemistry until 1938, when he came to King's College, London, as Professor of Chemistry. He held this position until 1945 when he was appointed Government Chemist.

Exhibition of apparatus

The Fine Chemicals Group of the Society of Chemical Industry will hold an exhibition of new laboratory apparatus and techniques in the Chemistry Department, Birkbeck College, Malet Street, London, W.C.1, on Tuesday March 24 at 4 p.m.–8 p.m.

Rating of plant and machinery revised

A new list of all types of machinery and plant which a Committee on rating considers should be liable to local rates on the principles established by the Rating and Valuation Act, 1925, has been published. The list revises and brings up to date in the light of modern developments the existing list now 30 years old. If approved, the new list will come into operation on April 1.

The list is contained in the Report of the Committee on the Rating of Plant and Machinery (H.M.S.O., price 2s. 6d.) appointed by Mr. Henry Brooke, Minister of Housing and Local Government, to review the existing list as expressed in the Plant and Machinery (Valuation for Rating) Order, 1927.

Information room

The Information Room of the Industrial Division of Gordon and Gotch (Sellotape) Ltd. opened recently. It is situated on the ground floor of 8-10 Paul Street, London, E.C.2.

Meetings

Society of Cosmetic Chemists

March 16. "Ampholytic Surface Active Agents," by C. D. Moore. 7.30 p.m. Royal Society of Arts, John Adam Street, London, W.C.2.

Royal Institute of Chemistry

April 8. "Developments in Industrial Ion-exchange Processes," by T. V. Burden. 8 p.m. Luton and Bedfordshire College of Further Education, Park Square, Luton.

Institution of Chemical Engineers

March 17. "Residence Time Studies in a Spray Dryer," by G. Place, K. Ridgway and Prof. P. V. Danckwerts; "Purification of Hydrogen for Distillation—2," by W. H. Denton, R. Gayler and B. Shaw. 9.30 a.m. Church House, Westminster, London, S.W.1.

Chemical Society

ABERDEEN

March 11. "Study of Rapid Chemical Reactions," by Prof. G. Porter. 5 p.m. Dounreay Experimental Reactor Establishment.

EDINBURGH

March 19. Visit to Research Laboratories of the National Coal Board, Glasgow Road. 7.30 p.m.

IRISH REPUBLIC

March 18. "Amine Oxidation," by Prof. H. B. Henbest. 7.45 p.m. University Chemical Laboratory, Trinity College, Dublin.

NEWCASTLE-UPON-TYNE

March 18. "Polyethers," Prof. G. Gee. 6.30 p.m. Chemistry Department, King's College.

NORTH WALES

March 12. "Nucleotides and Bacterial Cell-wall Constituents," by Prof. J. Baddiley. 5.45 p.m. University College of North Wales.

SHEFFIELD

March 20. "Colour," by Dr. E. Averton. 7.30 p.m. Chemistry Department, The University.

Society for Analytical Chemistry

March 10. "Microbiological Assay of the B Vitamins," by F. W. Norris. 7 p.m. Gas Showrooms, Nottingham.

March 23. "Analytical Applications of Chelate Compounds," by Prof. H. Freiser. 7 p.m. The Chemistry Theatre, The University, Edgbaston, Birmingham 15.

Society of Chemical Industry

March 19, 2.15-5.45 p.m.; *March* 20, 9.30 a.m.-5.45 p.m. Symposium on "Costing in the Chemical Industry." The Beveridge Hall, London University, W.C.1.

April 6. "Chemical Industry and the Free Trade Area," by W. A. M. Edwards. 6.30 p.m. 14 Belgrave Square, London, S.W.1.

MICROBIOLOGY GROUP

April 2. A.G.M. 6.15 p.m. 14 Belgrave Square, S.W.1.

CHEMICAL ENGINEERING GROUP

March 19. "Extraction of Thorium," by W. D. Jamrack, R. A. Wells and Dr. J. H. Buddery. 7.30 p.m. Nottingham and District Technical College, Burton Street, Nottingham.

April 3. "Titanium and its Alloys as Materials of Construction for Chemical Plant," by Dr. K. W. J. Bowen. 6.30 p.m. Robinson Lecture Theatre, Manchester University, Oxford Road, Manchester 13.

Shell refinery enlarged

A second crude oil distillation unit is now "on stream" at Shell Haven refinery in Essex on the Thames Estuary. Costing, with tankage and ancillary equipment, approximately £6¼ million, this unit has a daily capacity of 11,000 tons (80,000 barrels per day) of Middle East crude oil, and its operation approximately doubles Shell Haven's distilling capacity to about 8 million tons p.a.

The new unit has two special features. First, a high degree of heat recovery is employed, so that fuel consumption in the operation of the unit will be some 30% lower than in previous designs. Second, a good recovery of light hydrocarbons is obtained by use of a large high-speed centrifugal compressor.

New ion exchange materials

The Permutit Co. Ltd. have extended their range of ion exchange materials for chromatography to include:

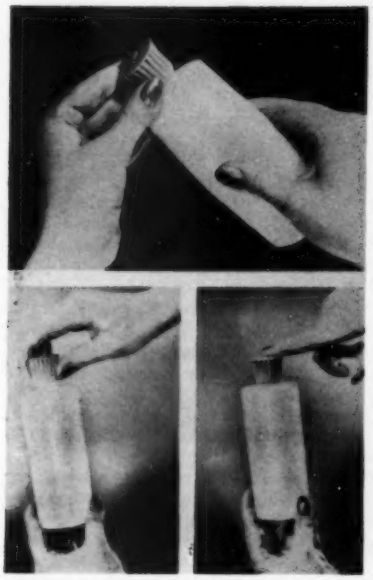
Zeo-Karb 226 (carboxylic resin of cross-linked polymethacrylic acid),

De-Acidite G (weak base polystyrene tertiary amine resin) and

De-Acidite H (mixed base polystyrene tertiary and quaternary resin).

These are in addition to the existing *Zeo-Karb* 225 (polystyrene sulphonic acid resin) and *De-Acidite FF* (strong base polystyrene quaternary ammonium resin) grades.

Packaging



Left: This pull-push closure is opened when the cap is pulled up and closed when it is pushed in. Cap and body can be in contrasting colours.

Right: Attractively printed polystyrene tubes made by the Plastics Group of the Metal Box Co. Ltd. range in size from 36 mm. × 59·6 mm. to 10·7 mm. × 25·4 mm.

Colourful bath tablets

The colour appeal and preservative qualities of aluminium foil now help sales of bath salt tablets exported by the Dubarry Perfumery Co. Ltd. The foil is 0·009 mm. thick, wax backed to a 13½ lb. double-crown tissue. Measuring about 5 in. wide, it is star embossed and is supplied in a range of six colours by Venesta Ltd.

The tablets are wrapped on a fully automatic wrapping and labelling machine which produces 48 tablets per min.

★

Pull-push closure

A pull-push closure of two-piece construction now available is made from Union Carbide polyethylene. The unit is chemical resistant and permits the contents to be ejected from the container when the reversed taper flare cap is pulled up, and seals when the cap is pushed in. The closure cap can be of one colour while the base can be of another colour to act as an open and closed indicator.

★

Adhesives in bar form

In the U.S. an adhesive in solid, dry bar form has been introduced. When rubbed on paper, it is said to leave a pressure-sensitive coating that is not sticky to the touch, yet with fingertip pressure will cause the item to adhere to other paper. The coating allows paper to be detached and re-stuck many times over, it is stated.

Lined pack for face pads

Weldex polythene-lined pockets are being used to pack Quickies *Travelfresh* moist face cleansing tissues. The pockets are printed right to the welded edges in two colours, are easily filled and heat-sealed automatically.

Weldex packs resist as well as retain moisture, and hold drugs, denture cleansers, hygroscopic powders, etc.

★

Polystyrene tubes

Several more pharmaceutical products are now packed in printed polystyrene tubes made by the Plastics Group of the Metal Box Co. Ltd. They include *Ferromyn* and *Ferromyn B*, two developments in oral iron therapy, made by Calmic Ltd., and *Hypon*, an analgesic and antipyretic, also made by Calmic Ltd. The *Ferromyns* are new products in a new pack, but *Hypon* has been on the market for some time. Another remedy which has recently been put into a polystyrene pack is Fennings *Little Healers*.

The tubes for these four products give some idea of the variety of sizes available. *Ferromyn* and *Ferromyn B* are packed in large tubes, which measure 36 mm. by 59·6 mm. and hold 100 tablets. Made of white polystyrene printed in black and yellow, the tubes are fitted with polythene stoppers. The stopper for *Ferromyn* is white, and that for *Ferromyn B*, yellow, to make identification easier. *Hypon* is packed in a medium-sized tube (12·7 mm. by 60·3 mm.) of white polystyrene printed in black and red. The polythene stopper is red. Fennings *Little Healers* are packed in a tube measuring 10·7 mm. by 25·4 mm. which holds 36 pills. Also of white polystyrene, it is printed in green, with a black polythene stopper.

★

New tube caps

The range of flower pot tube caps available from the Flexile Metal Co. Ltd. has been completed with the addition of two new sizes, a 115 and a 135. These are available in polythene for metal or plastic tubes and come in a wide range of colours, including natural.

★

Blood plasma problem

The Printing, Packaging and Allied Trades Research Association is trying to find an efficient method of packaging blood plasma. So critical is the moisture content of plasma that there should not be an uptake of more than 0·5% over 10 years.

The work is being carried out for the Department of Health for Scotland, which is planning to build up a bank of plasma.

The plasma is at present packed in glass bottles and sealed in nitrogen, but too much moisture is being taken up.

PATRA is trying out overwrapping of the bottles of plasma in MXXT cellulose film. The bottles are then packed in dozens in a fibreboard box overwrapped with MXXT film. The pack is now being shelf-tested.

News from Abroad

ISRAEL

Phosphorus plant to be built

Agreement has been reached between the Government of Israel and a "foreign firm" concerning the establishment of a plant to manufacture elemental phosphorus near the Oron phosphate mines in Negev, the southern desert half of Israel.

The agreement provides that the Israel Government will establish an Israeli company to manage the plant.

Elemental phosphorus will be produced from local phosphate at a rate of 10,000 metric tons annually, with the possibility of increasing capacity to 29,000 tons annually.

The foreign interest involved will assist in the design and construction of the plant and is to start trials on a full industrial scale within three months. It is to invest an amount equal in nominal value to $750,000 in shares and debentures of the new Israeli company.

GERMANY

Starch convention

The Annual International Starch Convention, organised by the German Cereal Research Station at Detmold, will be held from April 21 to 23. It will be followed on April 24 by a special Convention to celebrate 75 years of potato research.

The first plenary session of the newly formed International Committee for the standardisation of analysis of starch and its by-products will also be held at Detmold on April 24 and 25.

Further details of the Conventions may be obtained from Dr. E. Dux, Sichel Adhesives Ltd., 6 Friars Lane, Richmond, Surrey.

New petrochemicals plant

Good progress is being made in the construction of the new petroleum chemical products plant for Erdölchemie G.m.b.H. at Dormagen, near Cologne in Western Germany. Erdölchemie is a jointly owned company in which the British Petroleum Co.'s German associate, BP Benzin und Petroleum A.G. and Farbenfabriken Bayer A.G., each have a 50% interest. The first unit of the new plant was completed last September. Construction is going forward on other units and the first stage of the new plant should be completed in the summer.

In keeping with progress on plant construction, Erdölchemie has raised its nominal capital from DM. 50,000 to DM. 87,500,000, BP and Bayer sharing equally in the increase. Under current plans total investment by Erdölchemie will exceed DM. 300 million (£25 million).

Technical commissions meet

At a meeting held recently at Leverkusen under the chairmanship of Prof. Loncin, the International Commission on Terminology of the Comité International de la Detergence discussed the definition of general terms concerning surface active agents, and compared German and French studies on a classification project for the latter. The next meeting will be held in Paris at the end of April.

Another commission, that on methods of analysis, met at Vlaardingen under the chairmanship of Dr. Sturm. After establishing its rules of procedure, the Commission heard reports on the analysis of soap, sodium alkaryl sulphonates and primary alkyl sulphates. The next meeting will be held in Milan at the end of September.

FRANCE

Exhibition and conference

The 5th Salon International de la Chimie will be held in Paris from June 18 to 29 as part of the International Conference on Chemistry, to be held from June 17 to 30. Full details may be obtained from M. A. Vauglin, 28 Rue Saint-Dominique, Paris (7e).

SWITZERLAND

Cyanamid's action against Italian firm

Patent infringement suits have been filed in Belgium and the Netherlands by American Cyanamid Co. against the Italian pharmaceutical firm, Lepetit, S.P.A. of Milan. This was announced in Zurich by Mr. R. T. Bogan, director of marketing, Cyanamid International.

Mr. Bogan stated: "Lepetit has been producing tetracycline in Italy and has been exporting this product into certain countries in violation of our patent rights, which were granted by the governments of those countries. We have, therefore, instituted these patent infringement suits."

Cyanamid has not brought suit against Lepetit in Italy because under existing Italian law, pharmaceutical products and processes for their production are not protected by patents.

NETHERLANDS

Van den Berg merger

Lindeteves n.v. and Jacobson Van den Berg and Co./Jacoberg Overzee n.v. have amalgamated and are now trading under the name of Lindeteves-Jacoberg N.V., in Amsterdam. For the time being the head office of Jacobson Van den Berg and Co. will remain in The Hague and the Lindeteves office in Amsterdam. For practical purposes, the names of various affiliated companies established abroad will remain unaltered.

UNITED STATES

New coating process

A tablet coating process which does the job in 20 min. instead of three days has been developed by the Wisconsin Alumni Research Foundation. In *Drug and Cosmetic Industry*, Francis Chilson says the process consists in keeping the tablets suspended in an upward moving air stream while the coating materials are atomised directly on them.

Perfumers' symposium

The 5th Annual Open Symposium of the American Society of Perfumers will be held at the Essex House, New York, on April 20. Seven papers will be presented on "Instrumentation and the Perfumer." During the Symposium, Dr. P. Jellinek of Polak's Frutal works will receive an honorary membership in the Society in recognition of his contributions to perfumery.

Details of the Symposium and reservations can be obtained from Mr. Edwin D. Morgan, Jr., c/o Lever Bros. Research Centre, 45 River Road, Edgewater, N.J.

ARGENTINE

Detergent committee

A. L. Weil has been elected president of the Argentine Committe on Detergents; other members are: J. C. Espector, H. Valdez, E. Fridman, Ing. H. Garcia Collins, and E. J. Bachman.

AUSTRALIA

Polyethylene plant planned

Union Carbide Australia Ltd. is to erect and operate a polyethylene unit having an initial capacity of 15 million lb. p.a. The plant will be so constructed that its productive capacity can be increased by making relatively simple additions and minor alterations. Production is scheduled for early 1961.

Shell detergent plant

Following the recent opening of Shell's sulphuric acid plant at Geelong, Victoria, in Australia, and their decision to build an *Epikote* resin plant at Clyde, Sydney, Shell Chemical (Australia) Proprietary Ltd. are now to build a detergent alkylate plant at Geelong.

This plant, which will cost over A£1 million, is due for completion in early 1961. The production from the plant will, at full operation, represent an annual saving in foreign currency of over A£500,000.

The detergent alkylate is required for special applications in industry and by local soap companies.

New Products

Medicated shampoo

Chesebrough-Pond's Ltd. have introduced *Vaseline* medicated shampoo. It is said to be specially effective in dealing with dandruff and scalp germs. It contains *Bithionol* (2,2,thio-*bis*-4-6-dichlor-phenol) a local anti-infective agent, which is claimed to be strongly adsorbed on to the skin and hair and to inhibit the growth and reproduction of susceptible skin bacteria.

Diatomite polish

The manufacture of polishes has been launched in the hamlet of Kinloch Rannoch on the edge of Rannoch Moor, Scotland, by Mr. John M. Rollo of Bonnybridge, who has already pioneered manufacturing industries in the Scottish Highlands. His intention is to utilise Scottish materials and to take new industries to isolated areas. The first product of the little plant is *Di-atom*, a car polish in which Scottish-mined diatomite replaces china clay as the abrasive medium.

Diatomite from Skye has been worked for eight years, and is used extensively in powder form in paints, polishes, plastics, glues and creams, for various purposes. The new product is claimed to spread more easily and evenly than most car polishes and is being sold at a lower price.

New antihypertensive

Claimed to be considerably less toxic than existing rauwolfia compounds, *Singoserp*, a synthetic antihypertensive product of Ciba Pharmaceutical Products Inc., is also said to possess a more highly selective activity.

Intended primarily for patients requiring little or no sedation for effective blood pressure reduction, it is stated that the product can be easily combined with other drugs if necessary.

Influenza vaccine

Pfizer Ltd. have introduced an Influenza Virus Polyvalent Vaccine which contains three different strains of inactivated type A virus and one strain of inactivated B virus. The Asian strain of type A virus which was responsible for the last year's pandemic is present in a concentration of twice that of the other components.

According to the manufacturers clinical data available indicates that the immunological response of Type A (Asian strain) provides 66% protection within eight days of inoculation.

The suggested adult immunisation régime is usually two doses of 1 ml. each given subcutaneously, the second to be given not less than two weeks after the first. For children proportionately smaller doses should be given.

Distillers' new products

Two new products are available from the Distillers Co. (Biochemicals) Ltd. The first of these is *Zymocin* antiseptic lozenges. These contain xanthocillin and benzocaine in the form of pleasantly flavoured lozenges suitable for administration to adults and children.

Xanthocillin is effective against the Gram-positive and Gram-negative organisms found in most infections of the respiratory tract and inhibits secondary yeast and fungal activity. It has not been found possible to induce resistance to xanthocillin and there is no evidence of cross-resistance. Each lozenge contains 1 mg. xanthocillin and 5 mg. benzocaine.

The pack and prices are: Tube of 12 lozenges, trade price 2s. 6d., retail price 3s. 9d., exempt from tax.

Display outers containing 12 tubes are available.

The second product, *Distolyt*, is a balanced combination of chlorcyclizine hydrochloride and guaiacol glyceryl ether in tablet form which is said to facilitate expectoration of tenacious mucus and reduce the frequency of excessive unproductive cough. The product may be administered for relief of cough, for example, in bronchitis, influenza, laryngitis and allergic respiratory conditions.

Each sugar-coated tablet contains: chlorcyclizine hydrochloride 10 mg., guaiacol glyceryl ether, 100 mg.

Packs and prices are: Tube of 24 tablets, trade price 3s., Purchase Tax 11d., retail price (inc. P.T.) 5s. 5d.; bottle of 100 tablets, trade price 9s., purchase tax 2s. 9d., retail price (inc. P.T.) 16s. 3d.

Distolyt is a Schedule 4 Poison.

Pædiatric soporific

A form of *Welldorm* suitable for small children and babies is available from Smith and Nephew Pharmaceuticals known as *Welldorm (Paediatric)*, each scored tablet contains 2½ g. dichloralphenazone.

Packs and Prices are: 25×2½ gr. tabs, trade per doz., 18s., Retail each 2s. 3d.; and 500×2½ gr. tabs, trade per doz. 240s. and retail each 30s., exempt from tax.

Floor marking tape

Polyvil floor marking tape is now being supplied by John Gosheron and Co. Ltd. It is a P.V.C. tape with a rubber adhesive mass and it has been specially developed for the marking out of plant lay-out, transport lanes, storage space, taxi tracks, white lines on temporary roadways, etc. Once applied the tape stays on. It is available in 25 yard rolls and standard widths can be supplied in white or yellow, the usual floor-marking colours.

THE CHEMICAL MARKET

LONDON.—Owing to pressure on space our price list has been held over until next month.

Palm kernel oil is up by £1 to £146 a ton; **magnesium sulphate** also shows a rise of £1 and is now £16 5s. per ton.

Nicotinamide, formerly £3 15s., is now £3 5s. per kg., while **ephedrine hydrochloride** and **sulphate** in 500 g. lots are now £7 1s. 1d. per kg. against £7 2s. 11d.

Chloroform B.P. in ½-ton lots is down 2d. to 2s. 11½d. per lb. and **bismuth oxide B.P.C.** in 28-lb lots is now 26s. 10d. per lb., a decrease of 5d. **Atropine sulphate** in 500 g. lots has decreased by 15s. to £68 15s. per kg. **Ferri ammonium citrate B.P.** scales and granules in 1-cwt. lots show an increase of 1½d. to 4s. 7d. and 3s. 9d. per lb. respectively, while **silver nitrate** is up by 2½d. to 5s. 2½d. oz.

Refined yellow **beeswax** and **candellila** spot are both down 10s. to £27 and £23 a cwt. respectively.

Gum arabic lump has also decreased by 10s. to £6 15s. per cwt.

NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd., company registration agents, Chancery Lane, London. W.C. 2.

Parfums Belles Dames Ltd. 31.12.58. 27 Ely Place, London, E.C.1. Mnfrs. and dlrs. in perfumes, cosmetics, etc. £100. Dirs.: not named.

Leighton and Son (Retail) Ltd. 1.1.59. 169-173 Lumb Lane, Bradford 8. Chemical mnfrs. and dlrs. £10,000. Dirs.: H. and Audrey Leighton.

Surfax Laboratories Ltd. 1.1.59. Chemists, druggists, etc. £100. Sub.: R. H. Hornby, 62 London Wall, London, E.C.2.

Lundell (Chemicals) Ltd. 5.1.59. Bower Lane, Lingfield, Surrey. £100. Dirs.: D. A. Young, R. S. Stevens and C. D. Callieu.

W. J. Watterson Ltd. 5.1.59. 79 High Street, Wavertree, Liverpool 15. Chemists and druggists. £2,000. Dirs.: W. J. and Mrs. J. F. Watterson.

Clayton Pharmacy Ltd. 5.1.59. 21 Clayton Road, Newcastle-on-Tyne. £100. Dirs.: M. J. and Jean H. McCullagh and Pamela G. Williams.

Ralph N. Emanuel Ltd. 5.1.59. 69 Gloucester Place, London, W.1. Mnfrs. of and dlrs. in chemicals, gases, drugs, etc. £100. Dir.: R. N. Emanuel.

B. J. Hodgson Ltd. 6.1.59. 31 Tavistock Street, Bedford. To take over bus. of dispensing chemist cd. on as "Herbert and Herbert" at Bedford, etc. £2,000. Permnt. dirs.: B. J. and Jennifer Hodgson.

D. Dalis Jones Ltd. 7.1.59. 152 Holdenhurst Road, Bournemouth. Chemists and druggists. £2,000. Dirs.: D. D. and Mrs. E. H. Jones and Mary H. Key.

W. Tomlinson (Morecambe) Ltd. 8.1.59. 233 Westminster Road, Morecambe and Heysham. Chemists. £3,000. Dirs.: J. D. Casserly and R. Broomhead.

NEW TRADE MARKS

APPLICATIONS

Pharmaceuticals

SATINEX.—776,043. *Neatex Products Ltd.*

URICORTEN.—776,146. *Ciba Ltd.*

ARX.—776,879. *Harry Conn.*

PERNOFER. — 779,533. *Aktiebolaget Astra Apotekarnes Kemiska Fabriker.*

ALKA-SCORB.—779,971. *Carlton Laboratories (Southern) Ltd.*

PARVOL.—780,669. *The British Drug Houses Ltd.*

PROFEM.—781,187. *Schering Corp.*

DIAQUIN.—781,201. *Imperial Chemical Industries Ltd.*

SILTEN.—B781,266. *Silten Ltd.*

WARDUZIDE.—781,504. Ward Casson Ltd.

NILAMEZ.—781,548. *Imperial Chemical Industries Ltd.*

BRADOFORM.—781,549. *Ciba Ltd.*

LEVONOR.—775,863. *Nordson Pharmaceutical Laboratories Inc.*

PROLANCO.—777,005. *Agprolin Ltd.*

CAPOMATIC.—779,422. *Boots Pure Drug Co. Ltd.*

STANOCID.—780,295. *British Schering Ltd.*

MISTOMETER.—781,368. *Winthrop Products Ltd.*

TYROMIST.—782,018. *British Schering Ltd.*

MARZOID.—*The Wellcome Foundation Ltd.*

PERMACOP.—778,908. *A. and G. Nicholas Ltd.*

TRANCOPAL.—778,968. *Bayer Products Ltd.*

TRIBURON.—*Roche Products Ltd.*

URISTIX.—779,024. *Ames Co. Inc.*

HYPERIDEN. — 779,057. *Imperial Chemical Industries Ltd.*

HOLADIN.—779,101. *Bayer Products Ltd.*

CORTENSOR. — 779,363. *Dr. A. Wander A.G.*

DAXALAX.—779,576. *C. Pfizer and Co. Inc.*

LEEVE.—779,857. *C. Pfizer and Co. Inc.*

TRANCOPAL.—780,152. *Winthrop Products Ltd.*

ERISYLIN.—772,533. *Glaxo Laboratories Ltd.*

EFFRIN.—776,343. *Aspro-Nicholas Ltd.*

Cosmetics, toilet preparations

MAGIC MIRROR.—773,446. *Magic Mirror Beauty Salons Inc.*

RED MAGIC.—773,551. *Crystal Products Co. Ltd.*

IGOTINT.—778,275. *Hans Schwarzkopf.*

ROSOPHORE.—779,457. *H. E. Daniel Ltd.*

GAMAFOS.—780,884. *Gamlen (London) Ltd.*

GAMAKOTE.—780,887. *Gamlen (London) Ltd.*

FLORET.—777,106. *Ulter (Bradford) Ltd.*

VITAWELL.—778,290. *Wella Rapid Ltd.*

SILVER MAGIC.—778,501. *Boots Pure Drug Co. Ltd.*

NEW PATENTS

COMPLETE SPECIFICATIONS ACCEPTED

Pharmaceuticals and fine chemicals

Alkyleneimino derivative of hydroquinone and process of making same. *Ciba Ltd.* 809,535.

Disulphonic acid amides of the anthraquinone series. *Sandoz Ltd.* 809,491.

Carbazole derivatives and process for the production thereof. *Chemische Fabrik Promonta G.m.b.H.* 809,488.

Tetracycline derivatives. *Bristol Laboratories Inc.* 809,585.

Diazotizing aromatic amines. *Farbenfabriken Bayer A.G.* 809,350.

3 : 10-di-(4¹-carboxybutyl)-1 : 2 : 6 : 7-tetrathiacyclodiene and its salts and esters. *Merck and Co. Inc.* 809,654.

Steroids

Androstene derivatives. *G. D. Searle and Co.* 809,494.

Steroids and the manufacture thereof. *Upjohn Co.* 809,485; 809,493.

Miscellaneous

Therapeutic composition for the treatment of hair, scalp and skin. *Max Factor and Co.* 809,655.

Toothpaste containing stannous tin compounds. *Hedley and Co. Ltd.* 809,513.

Dyeing of linear structures of polyacrylonitrile and its copolymers. *Badische Anilin- und Soda-Fabrik A.G.* 809,382.

Dyestuffs

Mono-azo dyestuffs of the benzene-azo-pyrazolone series and metal complexes thereof. *Farbenfabriken Bayer A.G.* 806,709.

Mono-azo dyestuffs of the benzene-azo-naphthaline series and metal derivatives thereof. *Imperial Chemical Industries Ltd.* 806,657.

Phthalocyanine compounds. *Imperial Chemical Industries Ltd.* 805,562.

Monoazo dyestuffs of the benzene-azo-naphthalene series and metal complexes thereof. *Imperial Chemical Industries Ltd.* 805,560.

Process for the manufacture of salts of sulphuric acid esters of leuco vat dyestuffs of the anthraquinone series. *Durand and Huguenin A.G.* 806,634.

Mono-azo dyestuffs of the benzene-azo-benzene series. *Imperial Chemical Industries Ltd.* 806,271.

Production of dyestuffs of the phthalocyanine series. *Badische Anilin-und Soda-Fabrik A.G.* 806,175.

Dyestuffs of the α-nitroso-β-naphthol series. *Badische Anilin-und Soda-Fabrik A.G.* 805,673

Production of alpha- and gamma-modifications of metal-free phthalocyanine in solvent-stable form. *Badische Anilin-und Soda Fabrik A.G.* 805,514.

Mono-azo dyestuffs of the indazole-azo-resorcinol series and metal complexes thereof. *Compagnie Française des Matières Colorantes.* 806,166.

Disazo dyestuffs of the pyrazolone series. *Farbenfabriken Bayer A.G.* 805,777.

Production of sulphur-containing dyestuffs. *Badische Anilin- und Soda-Fabrik A.G.* 809,224.

Dyestuffs of the anthraquinone series. *Imperial Chemical Industries Ltd.* 809,043.

Fast dyeing of nitrogenous fibres with water-soluble metal-containing azo dyestuffs and acid milling dyestuffs. *Sandoz Ltd.* 808,647..

Polyazo dyestuffs. *Farbenfabriken Bayer A.G.* 808,798.

Metallisable monoazo dyestuffs and their use. *Geigy A.G.* 808,919.

Copper-containing polyazo dyestuffs. *Sandoz, Ltd.* 809,279.

New patents are from the *Journal of Patents*, and new trade marks are from the *Trade Marks Journal*. In each case permission to publish has been given by the controller of Her Majesty's Stationery Office. Each of the publications mentioned is obtainable from the Patent Office, 26 Southampton Buildings, London, W.C.2.

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March 1894

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Morpholine is a colourless, mobile liquid with a characteristic ammoniacal odour. It is completely miscible with water and boils without decomposition at about 129° C. Morpholine is both a secondary amine and a cyclic ether and is therefore a useful and effective solvent for a wide range of resins, waxes, organic pigments and dyes. Aqueous solutions of Morpholine are unusual in that they evaporate with little change in composition.

Applications:
Apart from its many uses as a solvent Morpholine soaps formed by its reaction with fatty acids are excellent emulsifying agents and find wide application in the manufacture of paints, lacquers, wax polishes, and other surface coatings. It is also of use as a corrosion inhibitor and, together with its N-substituted derivatives, has many applications in the synthesis of pharmaceuticals, dye-stuffs and rubber chemicals, etc.

A.M.P.

(2-Amino-2-Methyl-Propanol)

Properties:
A.M.P. occurs as a soft colourless mass of low melting crystals having a slight ammoniacal odour. It is completely miscible with water and many organic solvents. It boils without decomposition at about 165°C. and aqueous 0.1 M solutions at 20°C. have a *p*H of 11.3.

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Samples prices and technical literature available on application.

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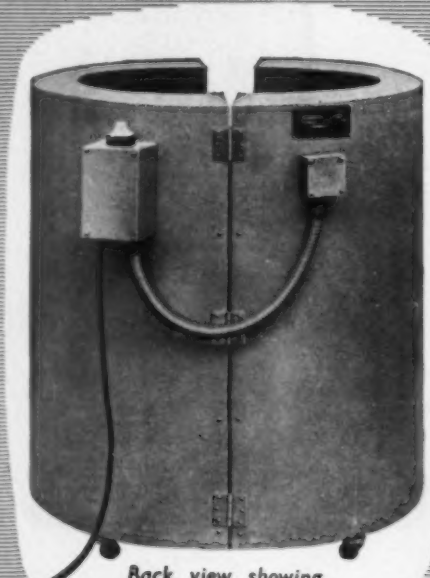

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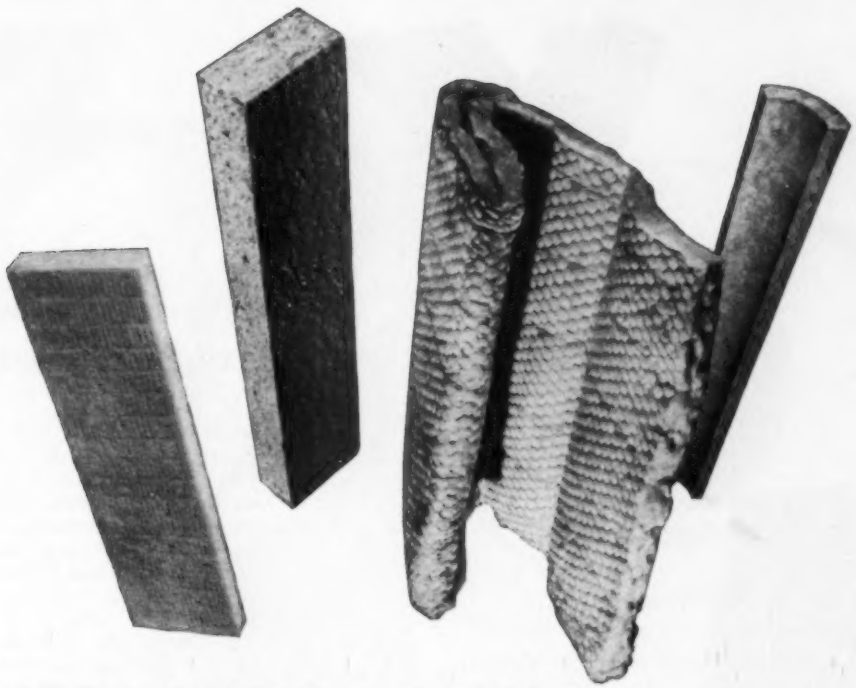

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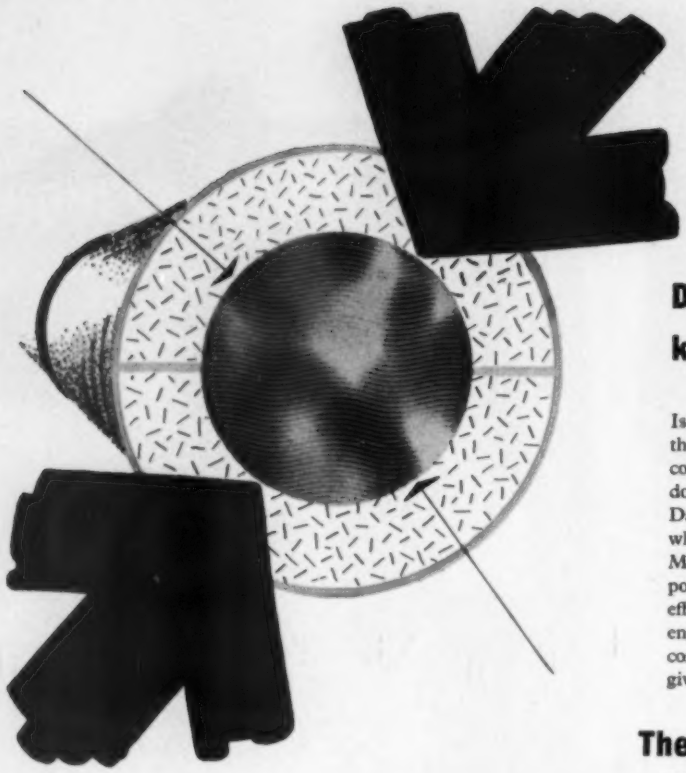

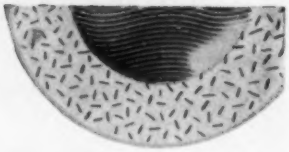

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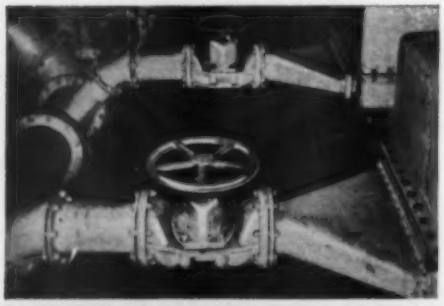

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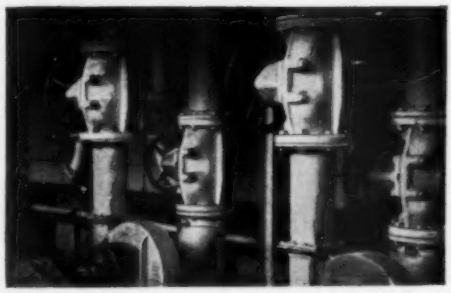

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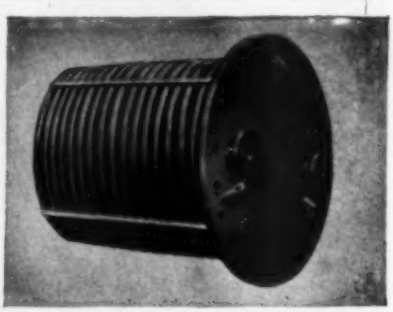

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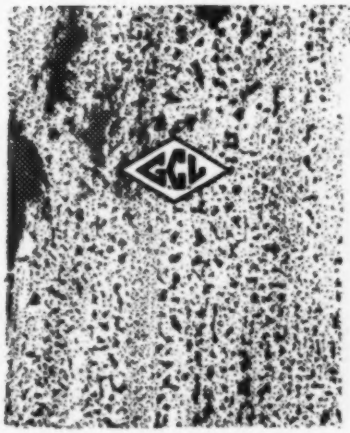

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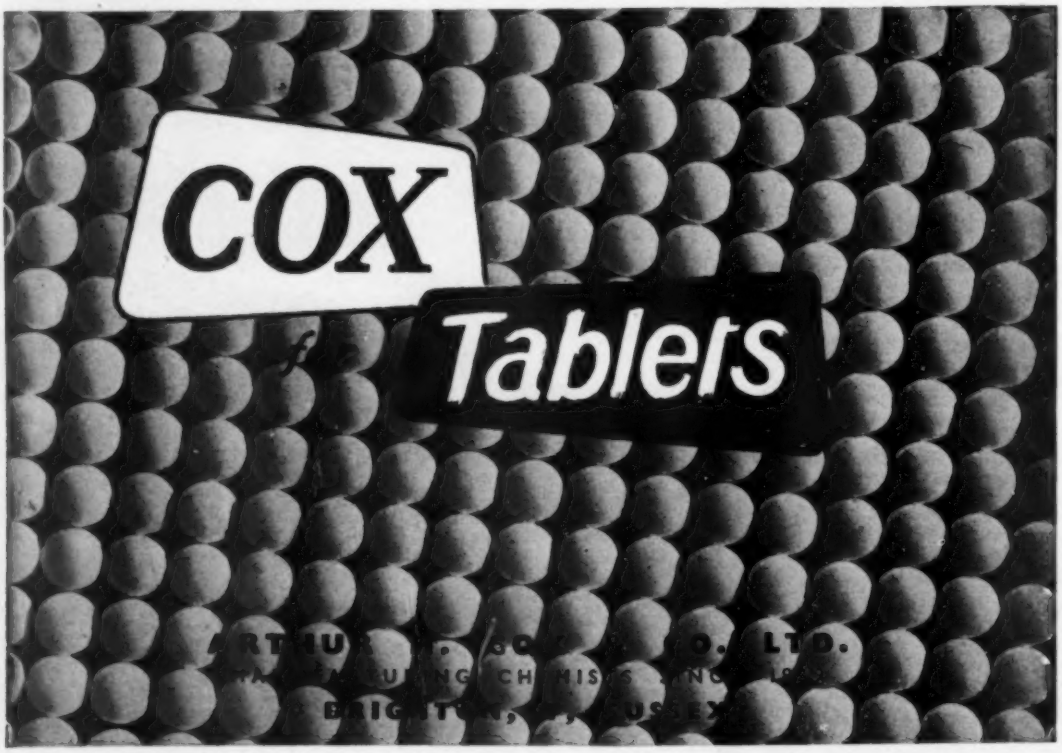

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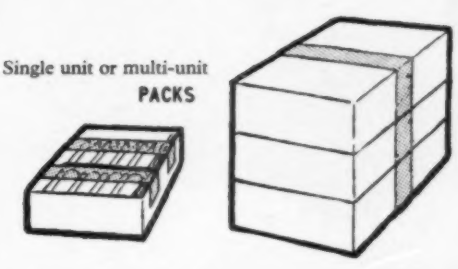

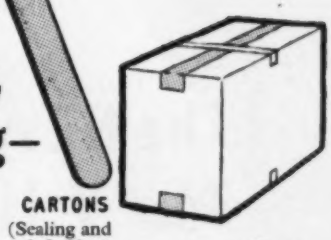

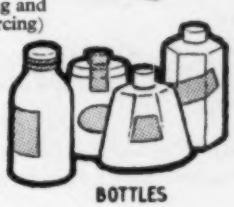

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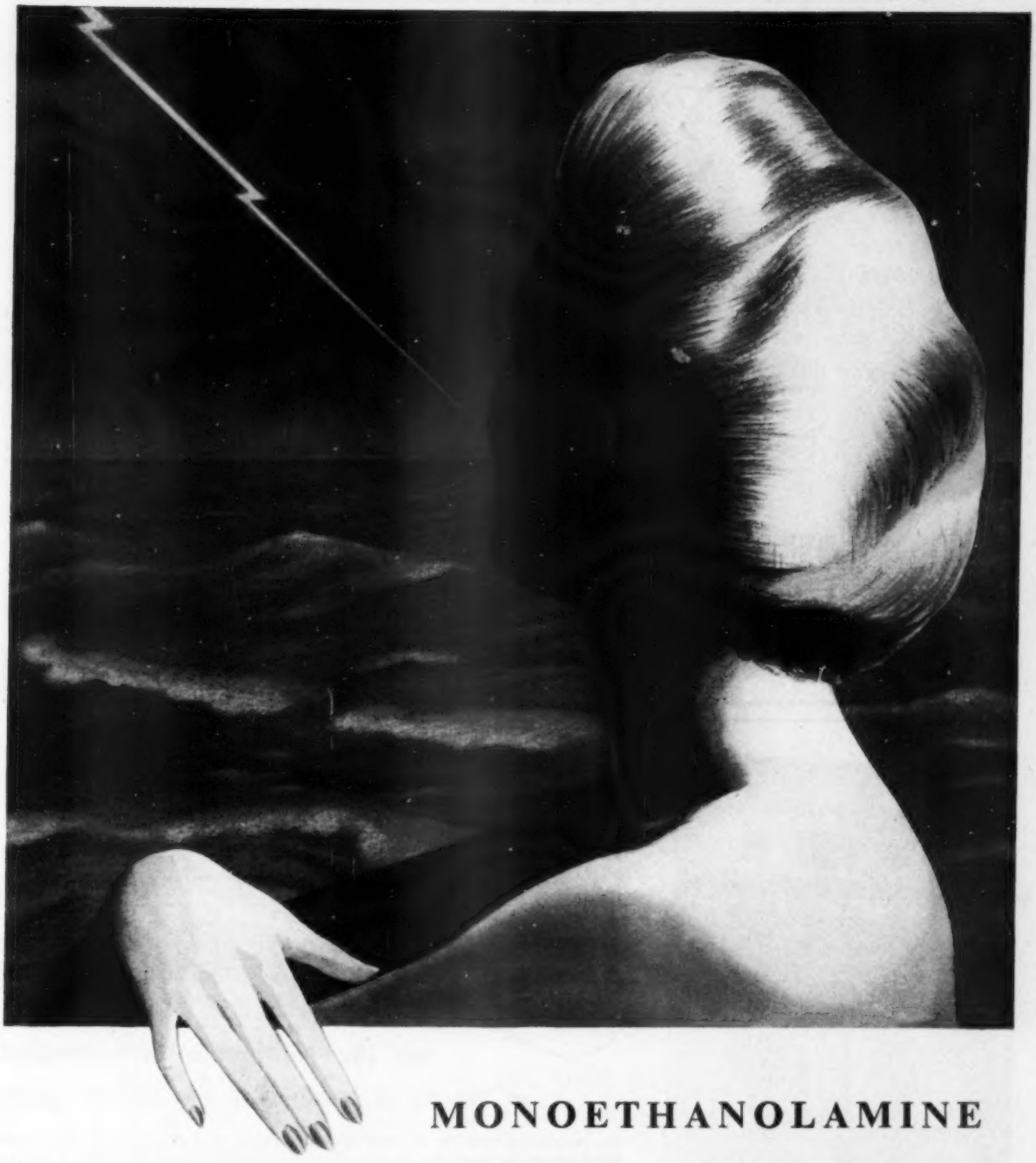

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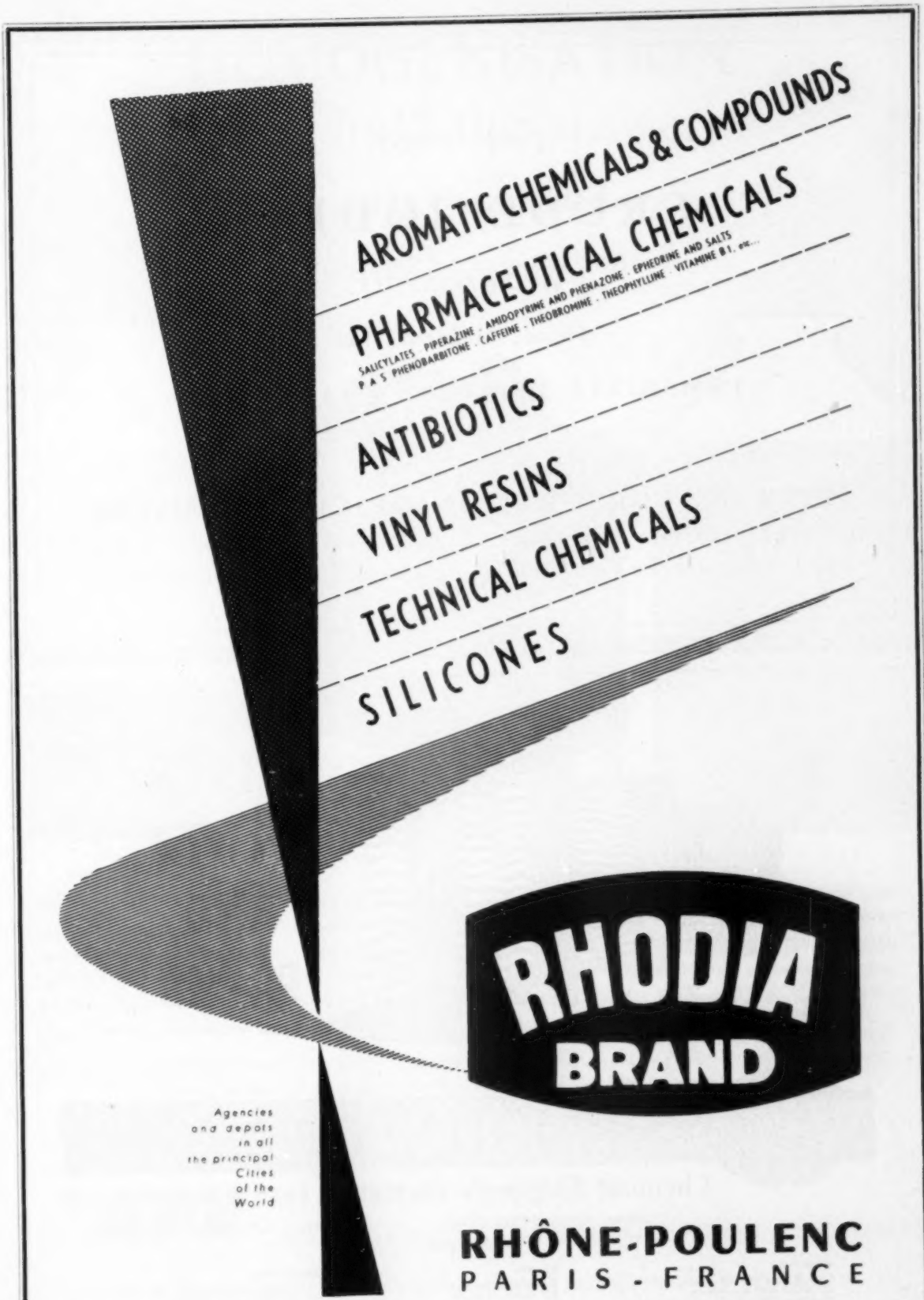
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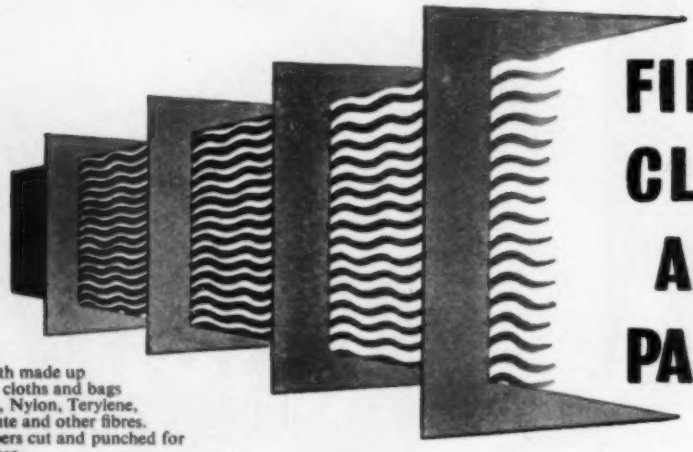

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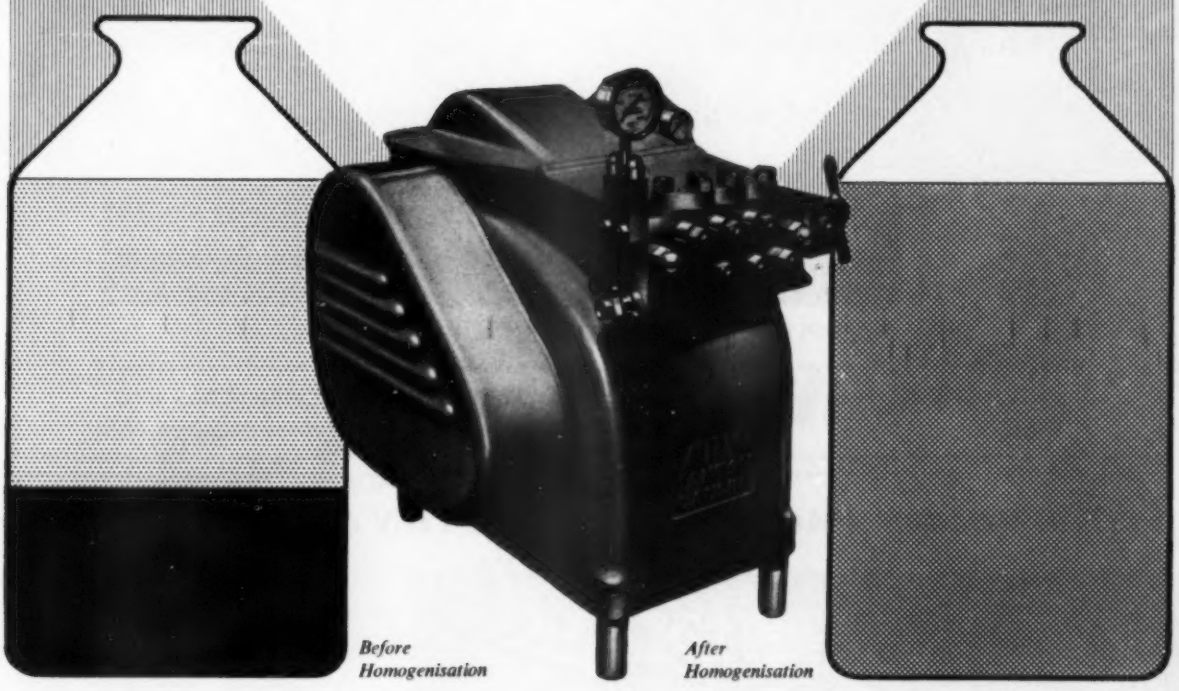

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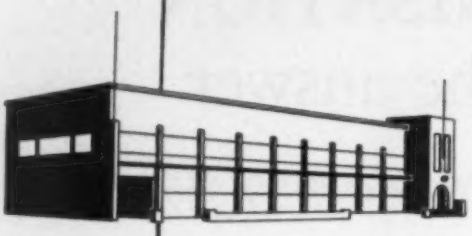

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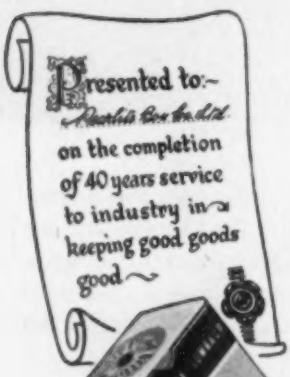

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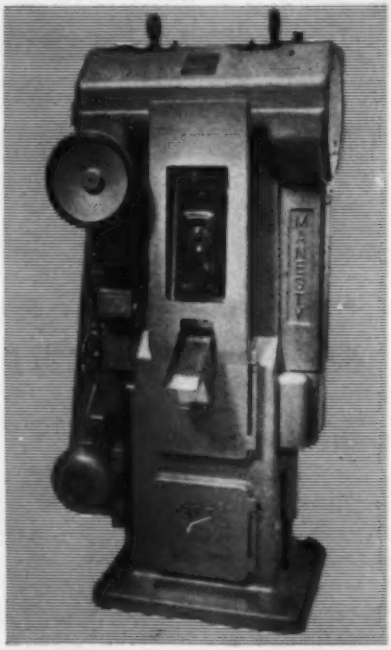

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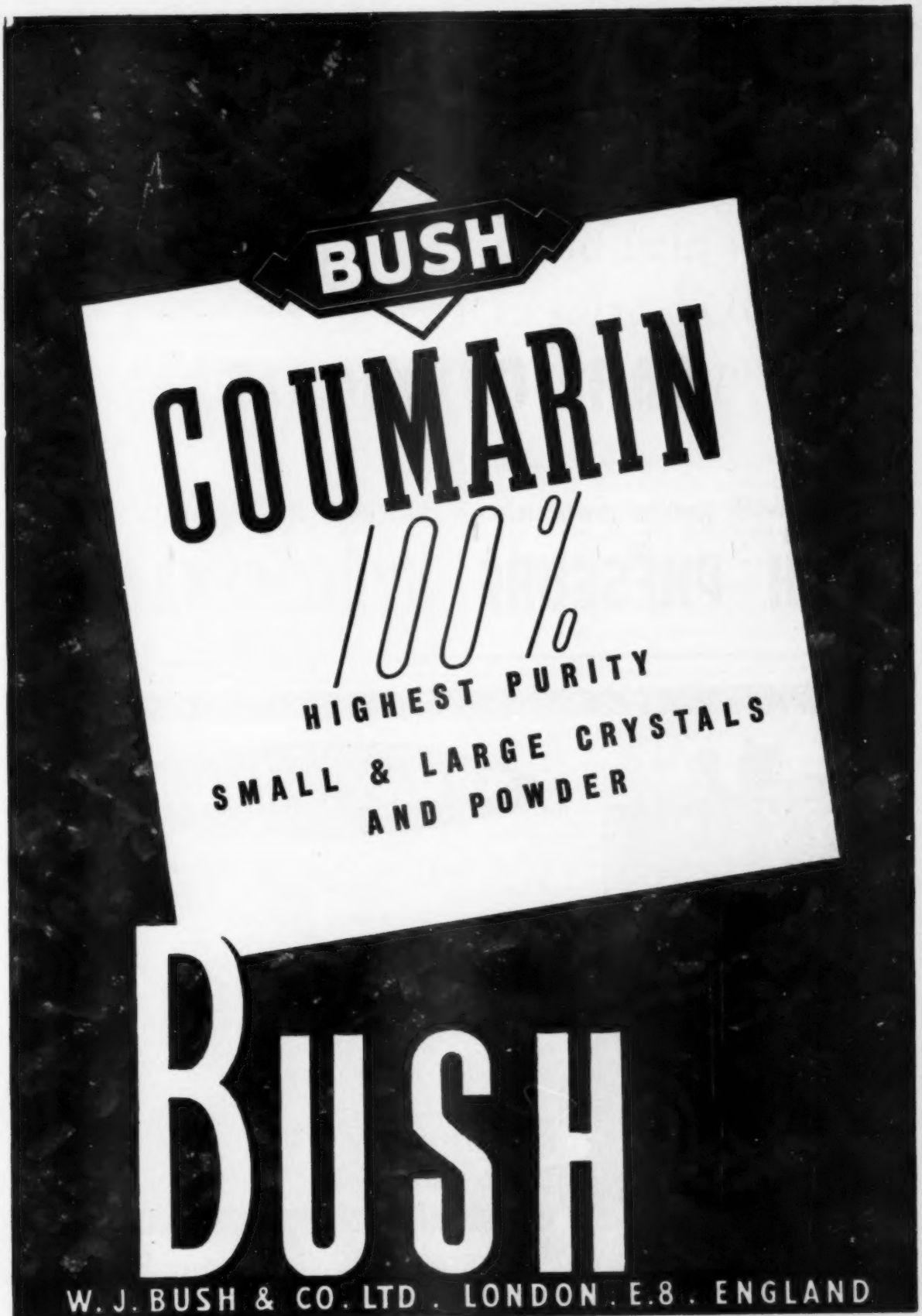
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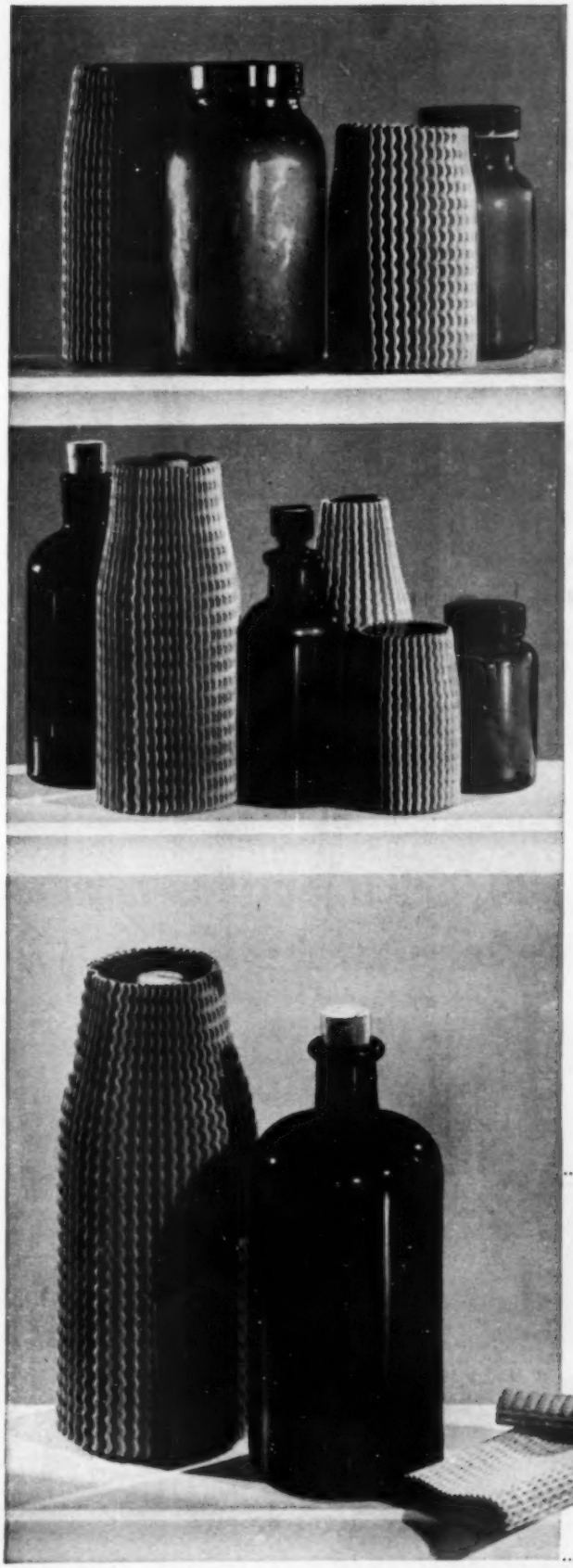

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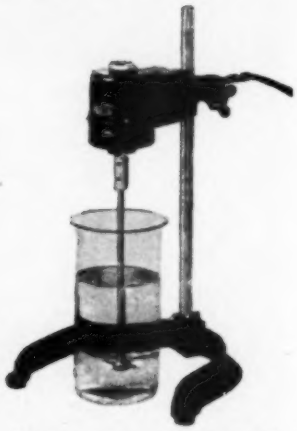

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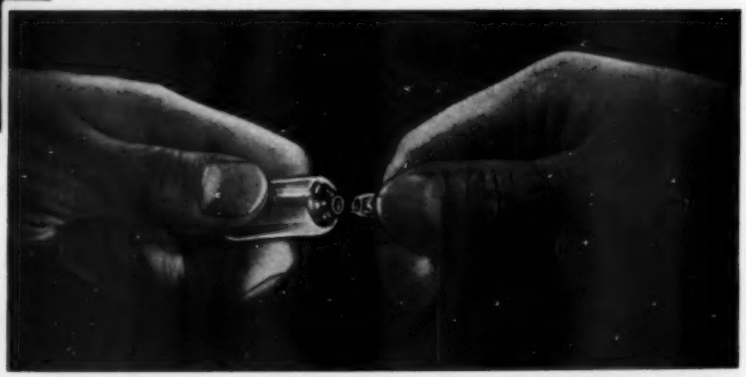

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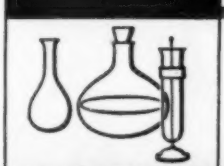

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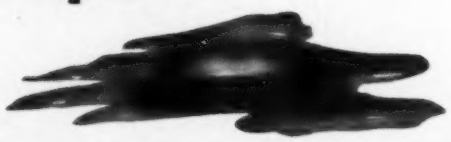

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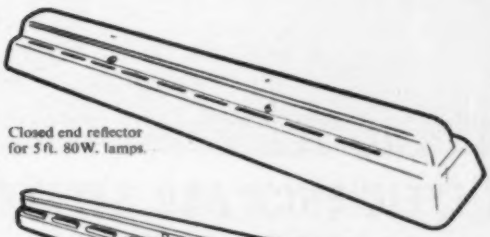
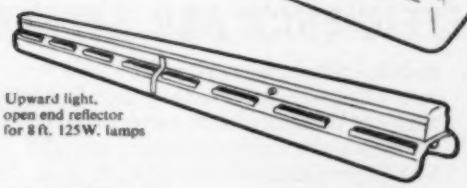
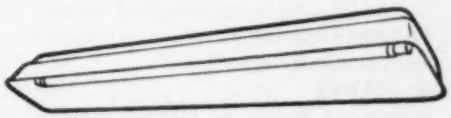


Closed end reflector for 5 ft. 80W. lamps.



Upward light, open end reflector for 8 ft. 125W. lamps

Open end reflector for 5 ft. 80W. lamps.



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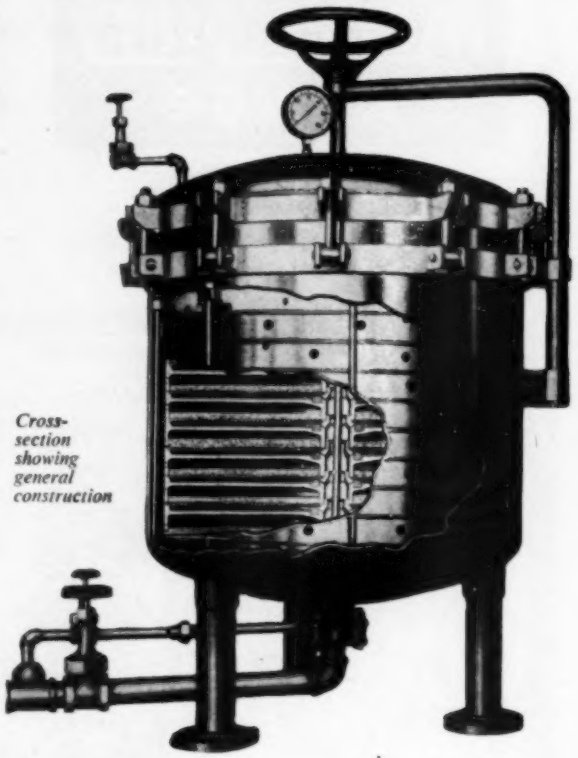

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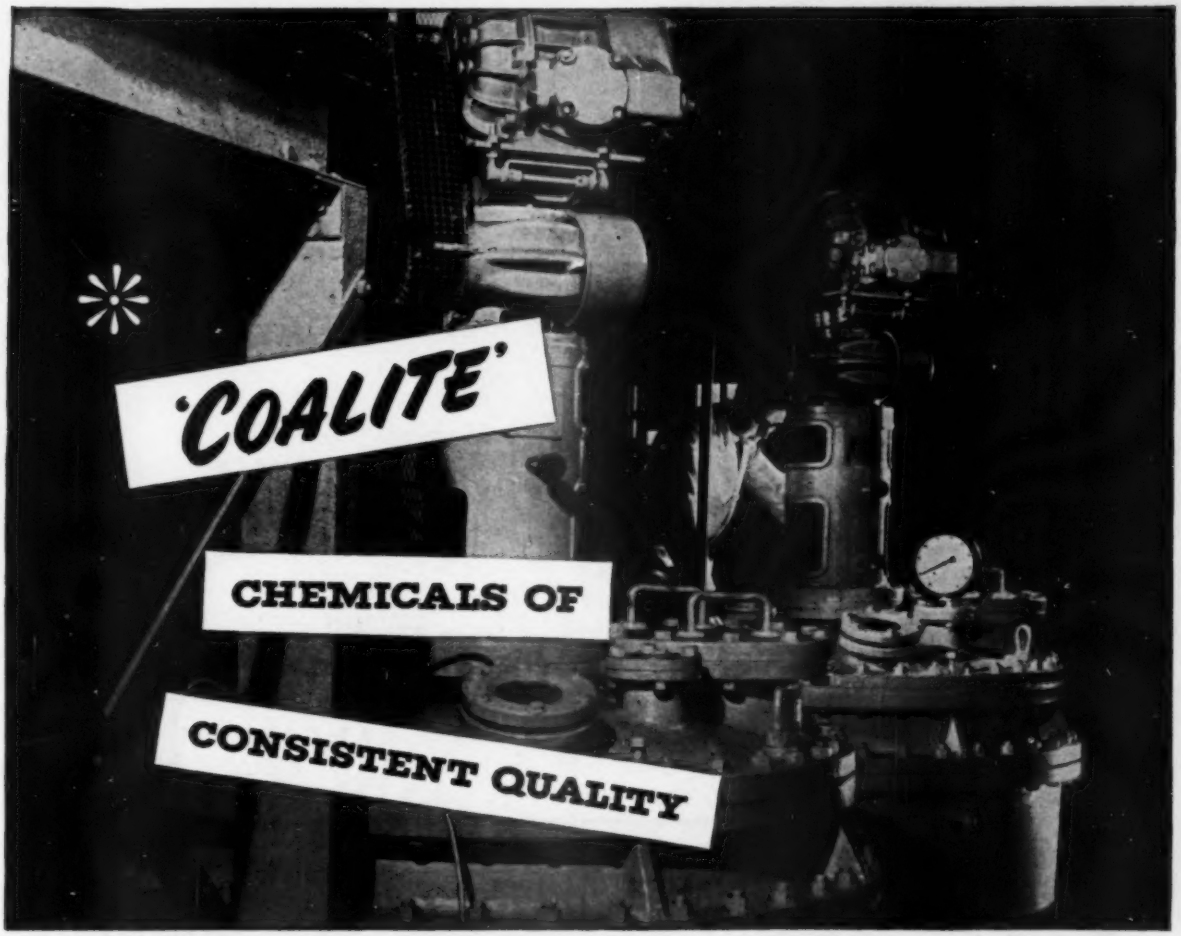

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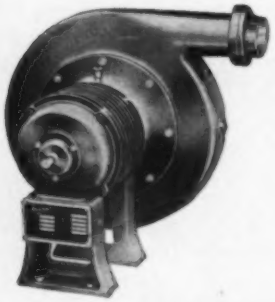

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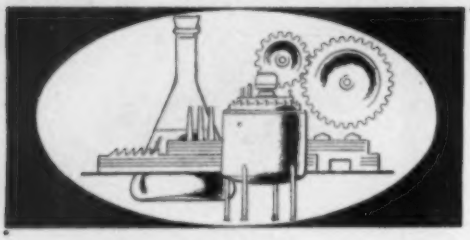

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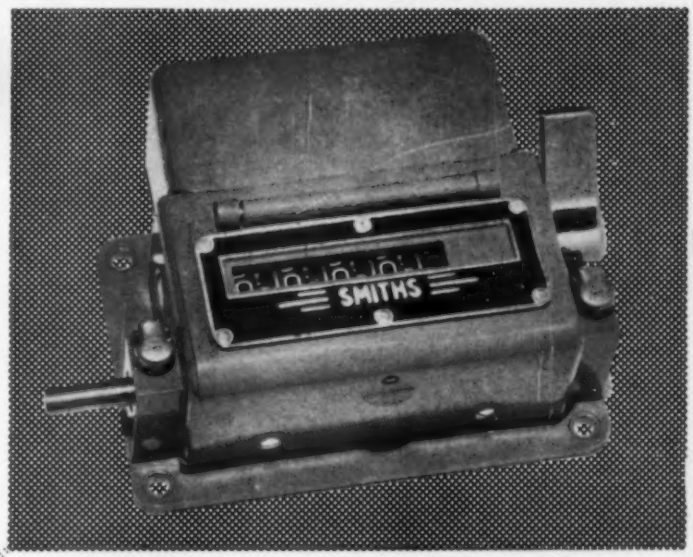

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Body:	Die-cast alloy, reasonably dust- and dirt-proof.
Counter:	White on black figures.
Speed of Count:	4,000 counts/min. Maximum Shaft Speed: 5,000 r.p.m.
Drive:	R.H. or L.H., plain shaft or flex attachment.
Rotation:	Top going or top coming.
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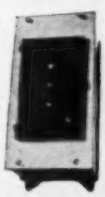

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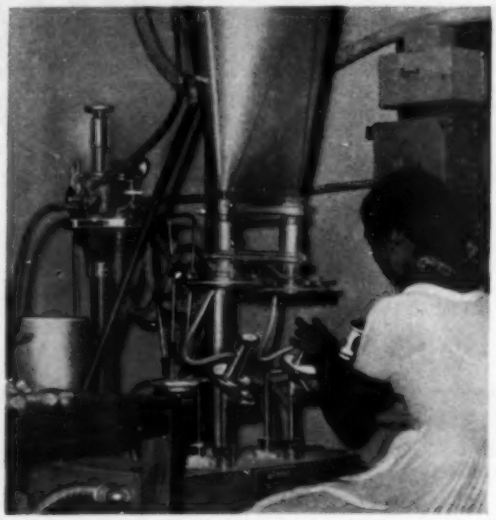

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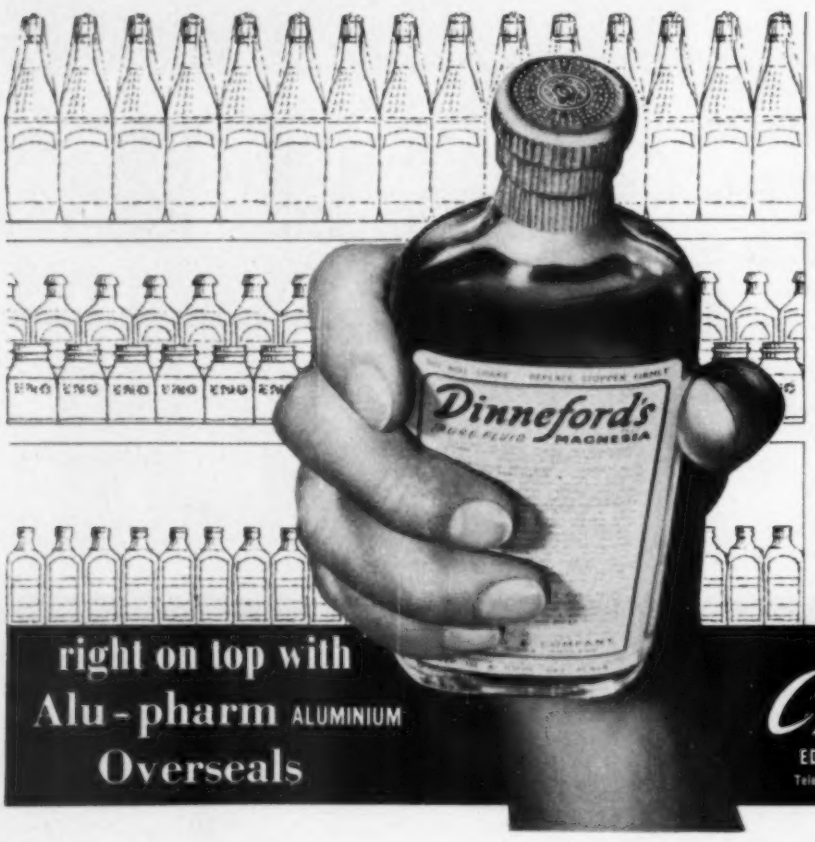

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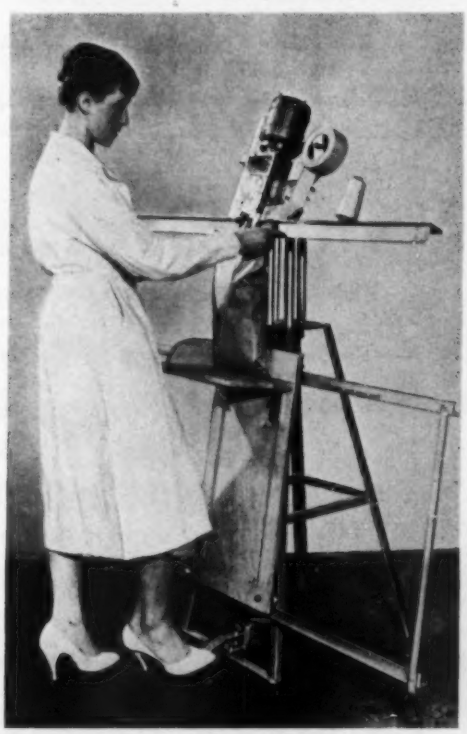

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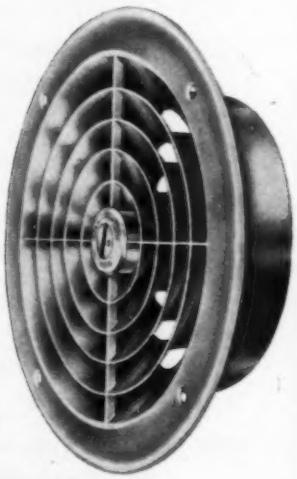

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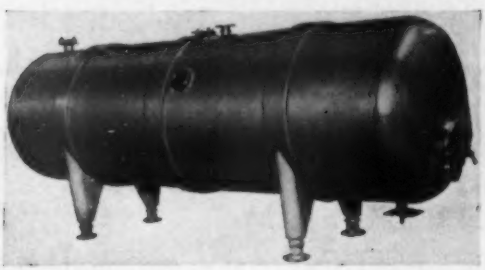

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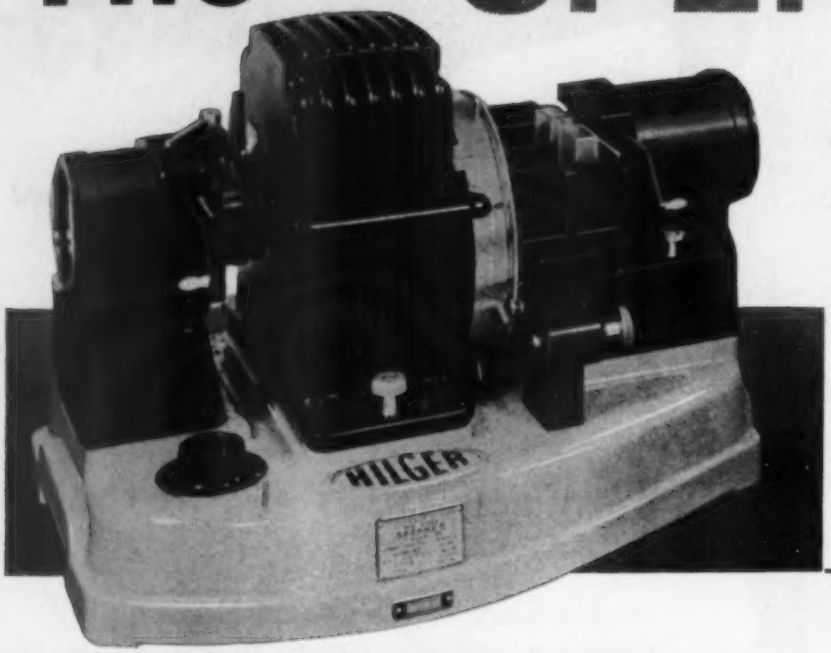

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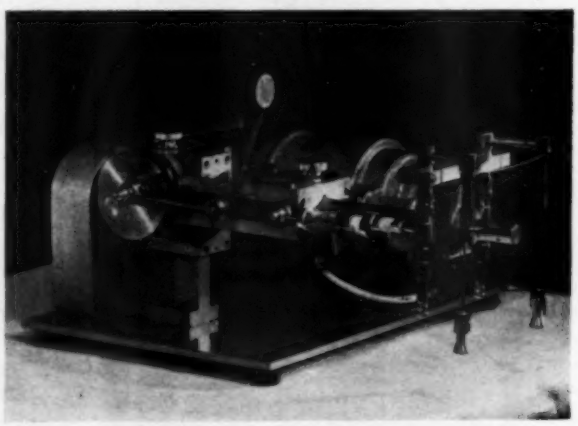

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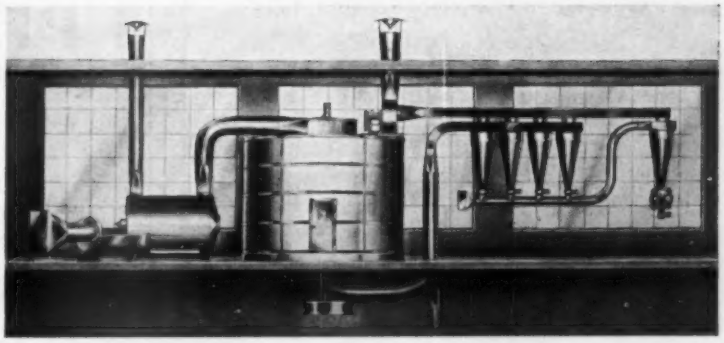

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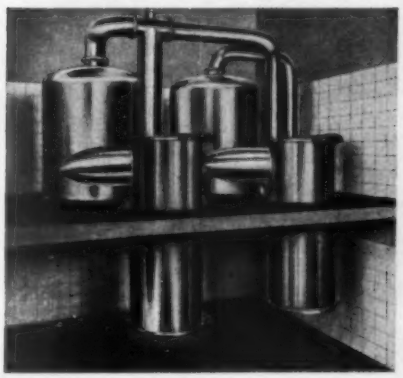

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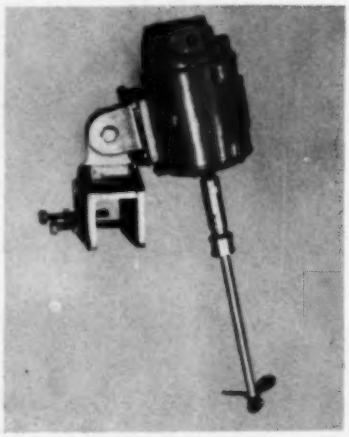

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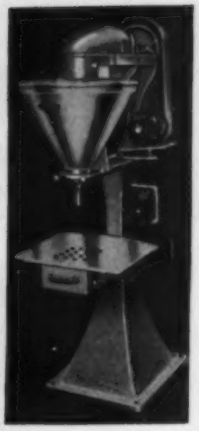

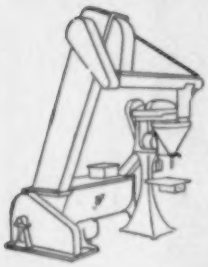

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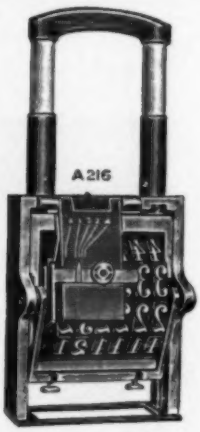

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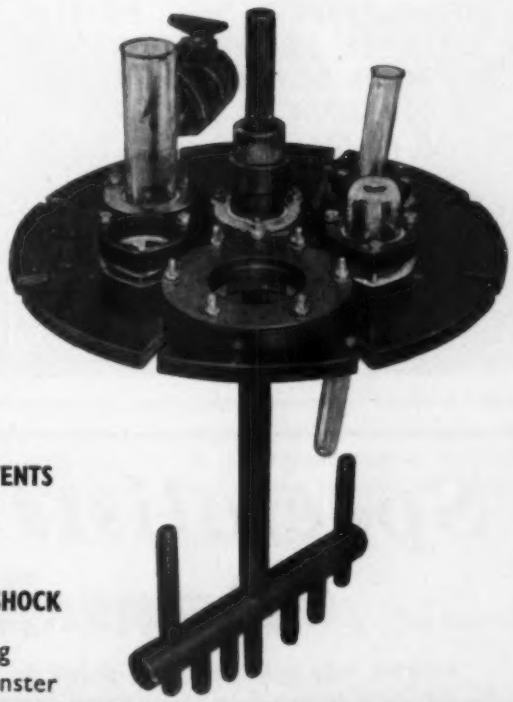

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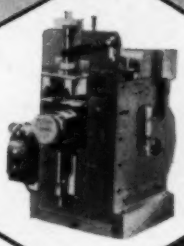

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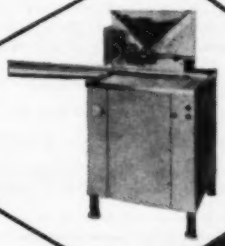

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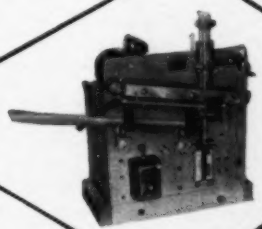

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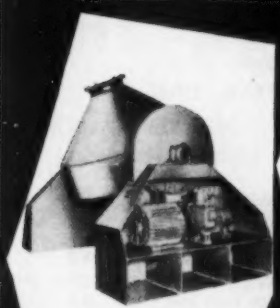

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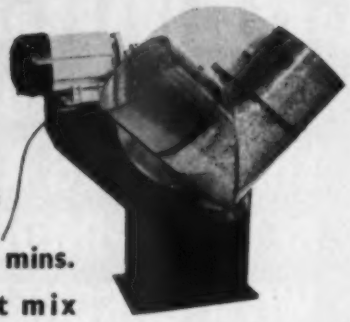

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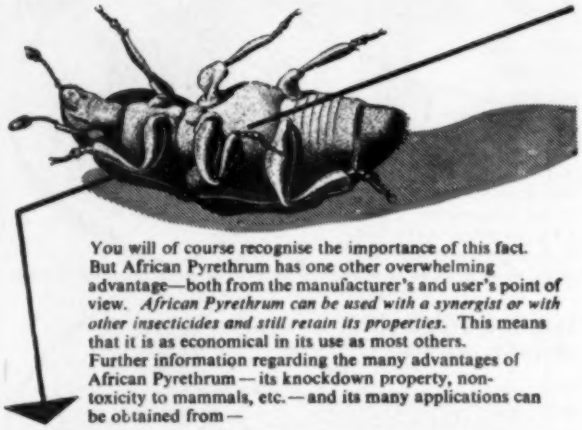

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